Stara

Constant Evolution

IMPERADOR 3100

Self-Propelled Sprayer

Instruction Manual

Quality Certificate Stara Constant Evolution ISO 9001

ORGULHO DE SER BRASILEIRO

Constant Evolution

IMPERADOR 3100
SELF-PROPELLED SPRAYER

INSTRUCTION MANUAL

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August/2015 - Revision A
MANU-7923-I

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FOREWORD

This user manual was designed to guide you in the operation of your machine, its components, and to instruct you on operation procedures and maintenance.

Read this manual thoroughly before using this product for the first time, and make sure to take all the necessary safety precautions.

This manual should be considered as a fundamental part and should be well cared for so that it is always available for review since it contains instructions starting with the purchase of the implement or machine to maintenance and long term care. At the end, there are also instructions on Warranty Terms, Warranty Registration, Technical Delivery and Technical Inspection.

Due to the constant evolution of our products, Stara reserves the right to make changes to the contents of this manual without prior notice.

This manual is available on our site www.stara.com.br, along with information on our entire product line.

INTRODUCTION

Dear Customer, you've just become the proud owner of a self-propelled sprayer, the Imperador 3100 Hydro/4x4, a machine developed and produced with the highest cutting-edge technology, of which had the direct involvement of clients and farmers in its development, making the Imperador 3100 a complete machine: comfortable, versatile and extremely efficient, when the subject matter is spraying.

The Imperador is equipped with a hydrostatic transmission, which is constant and independent on all four wheels, this being achieved through axial wheel motors with high rotation and low gear ratios, thus when connected to a reduction gearbox this high rotation is transferred into high torques. The hydro pump has distinctive market innovations, in that, even under high acceleration situations the oil flow is maintained thus avoiding high pressure spikes on hoses and other components of the transmission system.

Also it has an exclusive self-filtering system on the traction system, which considerably increases the life expectancy of the machine, along with lowering maintenance costs of the transmission.

The suspension is an active pneumatic system. This is achieved through an on-board air compressor (in-series), which maintains the pneumatic system at a constant and even pressure. This machine is exclusive in the marketplace, in that, it has a bolted modular chassis, thus allowing for higher impact absorption and vibration resistance, therefore, extending the life span of the machine by not having points for fractures to commence.

With its suspension and modular bolted chassis in combination with its perfect weight distribution between the front and rear axles, independently if the solution tank is full or empty, guaranteeing the Imperador of a zero skidding indexing.

The cab is spacious and comfortable. It is equipped with an air conditioning unit which has charcoal activated and pressurized filters. It also has a serial electronic spray control system, the Topper.

The booms are hydraulically driven from within the cabin, allowing you to work with heights of 0.7 to 2.20 meters. The booms work using an exclusive pendulum system, which allows the Imperador to operate on the most varied types of terrains.

Stara offers its after-market sales services, to assist you and your dealer, in the hopes of achieving the highest profitability and yield of your sprayer.

1 - MAIN COMPONENTS

The Imperador is equipt with some basic components (Figure 1 and Figure 2).

1 - Engine

2 - Wheel motor

3 - Traction pump

4 - Triplex pump

5 - Hydraulic oil reservoirs

6 - Transmission filter (self-filtering)

7 - Transmission and hyd. oil system cooler

8 - Spraying pump

9 - Sections control valves

10 - Product Mixer

11 - Spray booms

12 - Solution Main Tank

13 - Cabin

14 - Battery

15 - Ladder

16 - Pneumatic Suspension

17 - Refilling hook-up

18 - Diesel Tank

19 - Front wheel

20 - Rear wheel

21 - Transmission suction filters

22 - Exhaust

23 - Side catwalk

24 - Rear view mirrors

25 - Cab roof lights

26 - Driving lights

27 - Clean water reservoir

28 - Clean water barrel

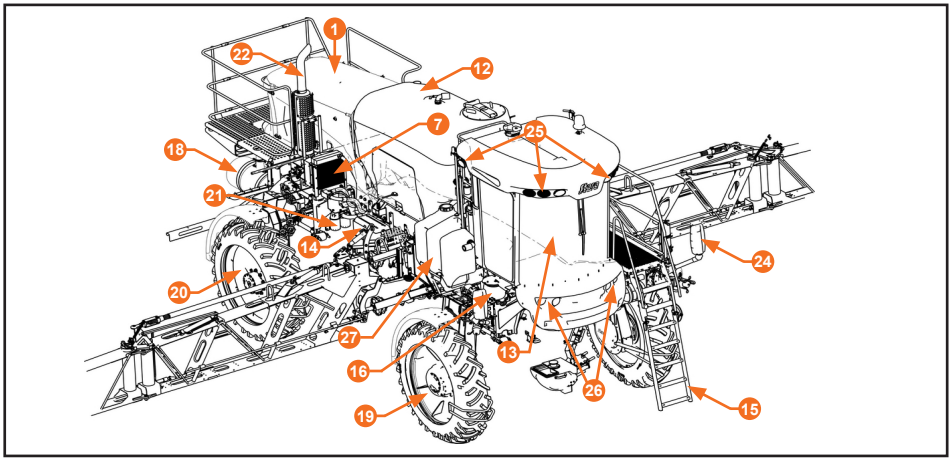


Figure 1

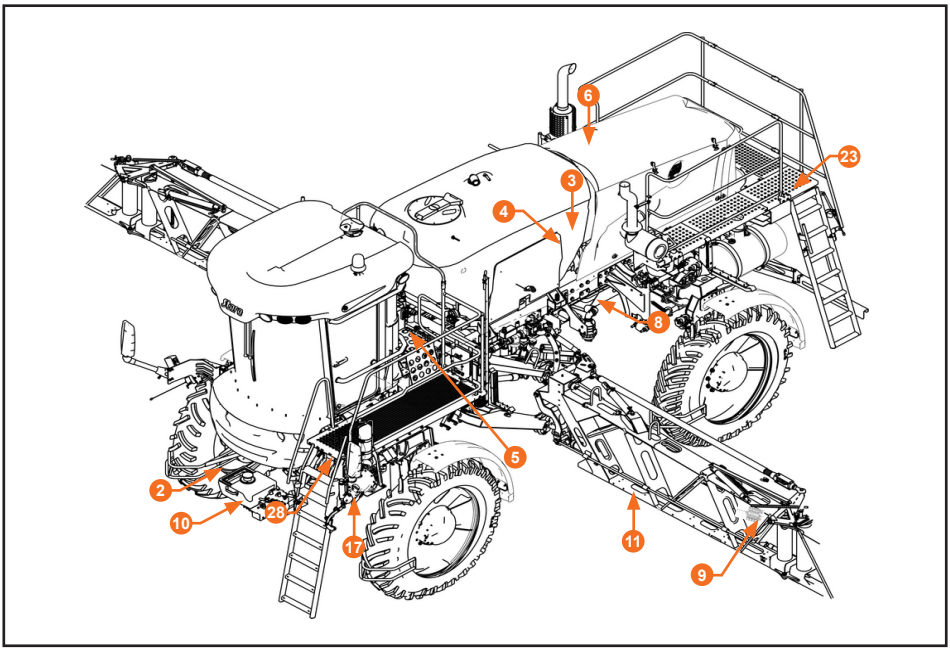


Figure 2

2 - IDENTIFICATION

Figure 3

All of Stara's machines have and identification plate, which contains the weight, capacity, model, date manufactured and its serial number.

When requesting parts or any information at your dealership, mention the information which identifies your machine.

The identification plate (Figure 3), is fixed to the chassis of the machine, on the front part under the cabin.

3 - TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS	
Machine net weight (empty)	9800 kg
Length	8 m
Width (booms closed)	3.20 m
Height	3.95 m
Booms	27 or 30 m
Tread gauge	2.85 to 3.50 m
Distance between axles	4.20 m
Ground clearance (loaded)	1.65 m
Application height	0.7 to 2.2 m
Solution tank	3100 liters
Clean water tank	300 liters
Fuel tank	280 liters
Spray pump	Stainless steel - 430 l/min
Engine	MWM turbo after-cooler diesel 6 cylinders 215 CV
Tires	Consult the pressure table on page 82.
Spray controller	Topper 5500
Agitation system	Solution transfer and hydraulic agitator
Filling system	External pump with a 400 l/min capacity
Trijet nozzle holders	Spacing 0.35 and 0.50 m
Optional	Cotton row opener Traction control Diaphragm pump 235 l/min Mechanical solution agitator Hydraulic tread gage

Table 1

4 - SAFETY PROCEDURES

The following items will describe the importance of operator safety, also clarifying common risk situations during normal use and machine maintenance, suggesting possible actions during these situations.

Figure 4

Precautions are necessary in light of the equipment being used and working conditions found in the field, or in maintenance areas. The manufacturer has no direct control regarding these precautions, thus it becomes the responsibility of the owner to enforce these safety procedures while working with the machine.

This implement follows design and work related SAFETY POLICIES FOR MACHINERY EQUIPMENT CONSTRUCTION per NR-12.

Changing the original design of the implement is not allowed, since any alterations could affect the operation of the implement, its safety and could reduce its lifespan.

Should you not fully understand any part of this manual and need the assistance of a technician, please contact your local Stara dealership.

Carefully read all safety related messages and warnings in your manual (Figure 4).

IMPORTANT!
Maintain this instruction manual in good condition and do not forget to consult it on a regular basis.

4.1 - General safety procedures

- When inspecting and refueling or refilling other materials, all should be done with the equipment turned off and parked, using all safe means of accessibility.
- It is forbidden to carry passengers on self-propelled machines and implements.
- When servicing or inspecting the machine in high risk areas, these should only be done by trained or skilled workers, when dealing with security issues.

4.2 - Know all safety information

This symbol is used as a warning sign (danger, warning and caution). When you see this sign on your implement, be aware of possible hazards (Figure 5).

Figure 5

Follow all recommended safety precautions and operational safety practices, understand the importance of your safety.

- Accidents can cripple you, even cause death.
- Accidents can be prevented.

4.3 - Decal care

- Do not remove or disfigure safety or job instruction decals.
- Maintain safety decals in good condition.
- Replace any damaged or missing decals.
- Replacement safety decals can be found at your local Stara dealership.

4.4 - Intended use

- This implement was specifically designed for spraying.
- This implement should be driven and operated by a trained operator.

4.5 - Improper usage

- Hitching-up, hooking-up or pushing other implements or accessories is prohibited.
- Do not use the machine as a product storage reservoir except for chemical or fertilizer job products.

Figure 6

- To avoid the risk of injuries or death, do not transport passengers or objects on the catwalk or on any part of the machine (Figure 6).
- While using the machine, the cab door must remain securely closed.
- Should you need to climb on the implement, do so only when the implement is stopped, and use the ladder.

WARNING!
The improper use of the machine, specially on irregular terrain or hilly terrain could cause overturning of the machine. Be extremely cautious during rain, snow, icing or any slippery terrain. If necessary, get off the machine and check the consistency of the soil. Never leave the machine while it is in motion, even if it is overturning, or suffer the possibility of being crushed (Figure 7).

Figure 7

4.6 - Precautions to work with safety

When performing certain procedures with the machine, use the required safety equipment as listed below (Figure 9).

- Waterproof gloves;
- Waterproof long sleeve overalls;
- Safety glasses;
- Hard hat;
- Water proof steel toe safety shoes;
- Hearing protection;
- Safety breathing mask with appropriate filter.

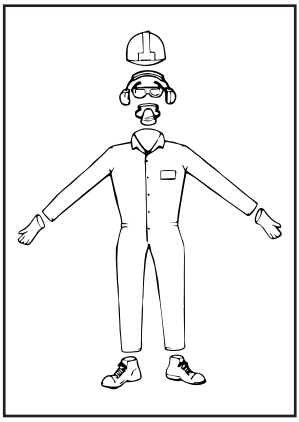


Figure 8

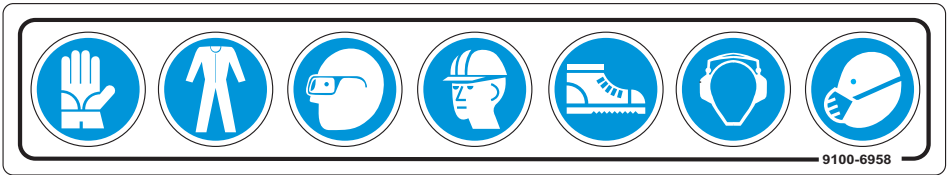


Figure 9

4.7 - Operating the machine with safety

- Learn how to properly operate the machine.
- Do not allow untrained persons to operate the machine.
- Periodically inspect all safety equipment on the machine before using it.
- Before operating the machine, check to see if there are any persons or obstructions near it (Figure 10).
- Maintain all steps, hand-rails and catwalks always free of residues like, oil or grease which can cause accidents (Figure 11).

Figure 10

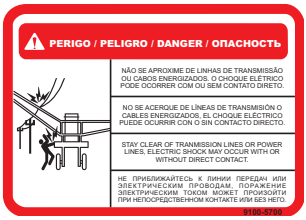
- Operate the machine only when all safety guards are properly installed and in their proper positions.
- Do not start the engine with the gear shift lever out of neutral.
- Do not leave the cabin while the machine is turned-on and the parking brake has not been applied.
- Reduce speed on curves.

- To climb on the machine use the anti-skidding steps on the ladder and do so only when the machine has stopped.
- Beware of moving parts hazards. When the engine is running, keep your hands away from the fan blades. (Figure 12).
- Do not consume food products in the cabin.
- Do not consume food products or drinks during the job.
- Do not smoke during the job.
- Do not operate near obstacles, rivers or streams.
- Drive with caution and slowly while on rugged and hilly terrain.
- When the engine is running, keep your hands away from the belts (Figure 13).
- Before starting any operations, check the surrounding work area. Check for any obstacles that may be near the machine, like trees, fences and electrical lines, which present injury risk hazards, even death (Figure 14).

Figure 11

Figure 12

Figure 13


PERIGO / PELIGRO / DANGER / ОПАСНОСТЬ
NÃO SE APROXIME DE LINHAS DE TRANSMISSÃO OU CABOS ENERGIZADOS. O CHOQUE ELÉTRICO PODE OCORRER COM OU SEM CONTATO DIRETO.
NO SE ACERQUE DE LÍNEAS DE TRANSMISIÓN O CABLES ENERGIZADOS. EL CHOQUE ELÉCTRICO PUEDE OCURRIR CON O SIN CONTACTO DIRECTO.
STAY CLEAR OF TRANMISSION LINES OR POWER LINES, ELECTRIC SHOCK MAY OCCUR WITH OR WITHOUT DIRECT CONTACT.
НЕ ПРИБЛИЖАЙТЕСЬ К ЛИНИИ ПЕРЕДАЧ ИЛИ ЭЛЕКТРИЧЕСКИМ ПРОВОДАМ. ПОРАЖЕНИЕ ЭЛЕКТРИЧЕСКИМ ТОКОМ МОЖЕТ ПРОИЗОЙТИ ПРИ НЕПОСРЕДСТВЕННОМ КОНТАКТЕ ИЛИ БЕЗ НЕГО.
9100-5700
Figure 14

- Check the machine for proper working conditions, like oil levels, tire pressures, radiator fluids and fuel level. In case of any irregularities which may hamper the operations, order the proper maintenance corrections prior to the operation or transport.

Figure 15

- Never enter the solution reservoir (Figure 15).
- Reduce speed on wet or frozen surfaces or surfaces covered with gravel.
- The maximum speed during operation or transport with a full solution reservoir, is 33 km/h. Should there be any dangerous situations, reduce the speed to is maximum.
- Check the control panel to verify that all functions and systems are in their proper working conditions.
- Beware of possible injury hazard risks during the job and while unfolding the booms (Figure 16).

- Do not operate the machine while under the influence of alcohol, tranquilizers or stimulants.
- Before driving the machine, release the parking brake and verify that the ladder has been retracted.
- Be careful not to crush your hands and arms (Figure 17).
- Avoid transporting the machine on steep terrain, since these can cause the overturning of the machine.
- Be careful when filling the machine, do not stand near the reservoir.
- Stay clear of mechanical moving parts like, joints and hot surfaces.

Figure 16

Figure 17

4.8 - Parking the machine in a safe area

Stop the machine in a secure place, being attentive on steep sloping terrain. To park, place the control lever (Figure 18) in neutral and await for the full stop.

With the machine already stopped, apply the parking brake to the ON position (Figure 19), located on the control panel, doing so will drop the boarding ladder.

Turn-off the ignition key and remove it.

Turn-off the main switch of the machine.

Figure 18

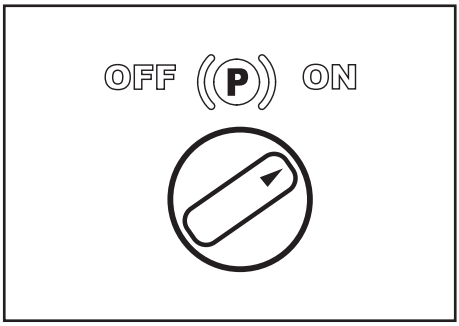


Figure 19

4.9 - Preventing unexpected machine start-up

Figure 20

- Protect yourself against possible injuries and even death, due to an unexpected machine start-up.
- Do not start the engine by jumping the terminals on the starter motor (Figure 20).
- The engine will not start if the safety circuits have been modified or deactivated.
- Do not, under any circumstances, start the engine while outside the cabin. Only start the engine while seated in the driver's seat, with the parking brake in the ON position and with the control lever in the neutral/center position.

4.10 - Safety measures while transporting the machine

The Imperador 3100 is exclusively a machine for agricultural use, due to its dimensions, it cannot circulate on public roadways or highways. Having the need to drive the machine or to transport it, these should be done according to local regulations, or done by authorized vehicles with all required local authorizations and permits.

4.10.1 - Lights and safety equipment

- Check your rear-view mirrors often (Figure 21).
- Always apply the turn-signal in the direction of your turn (Figure 22).
- The warning beacon should be located on the roof of the cabin and turned-on (Figure 23).
- Use driving lights, emergency signals, and turn-signals during the day or night time.

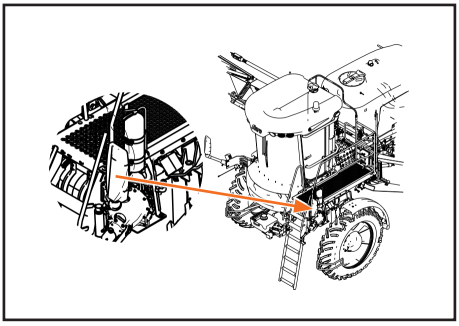


Figure 21

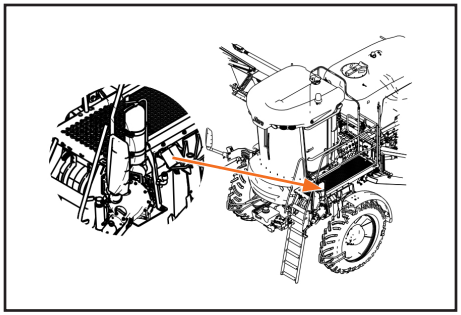


Figure 22

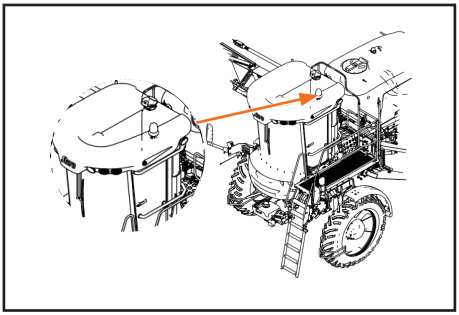


Figure 23

- Respect all traffic signs.
- Always maintain turn-signals, lights and reflectors clean, so that they can be clearly seen. Also, before driving, check the driving lights, turn signals and emergency lights, that they are all in good working conditions. In case that they are not, request for a service technician to repair the item, which are available at your local Stara dealership.

4.10.2 - Driving the machine

- When driving the machine, always use the wheel tread gauge at its minimum setting.
- Take care when placing the booms in their rests, making sure that they are in their fully rested position, lowered to the end. Press its button for 5 seconds, to make sure that the booms are securely on the rests.
- Move the warning beacon switch to its on position.
- If the solution reservoir is full, do not use the 4th. gear.
- Do not exceed the local or national speed limits.

4.11 - Cautions on steep terrain

- Avoid holes, ditches and obstacles which could overturn the machine, specially on steep hills (Figure 24).
- Avoid tight curves on slopy or hilly terrain.
- Never operate the machine near ditches or rivers, which are prone to overturning, causing serious injuries and even death.
- Avoid steep slopes when operation the machine.

Figure 24

4.12 - Avoid heating parts near fluid lines

Heating lines could weaken the material, bursting the lines and causing high-pressure leaks. This could cause severe burns and major injuries

4.13 - Work in well ventilated areas

- Never work the machine in closed areas. Work should be done in open and ventilated areas, due to exhaust fumes, chemical products and fertilizers, which if inhaled, can cause asphyxiation.
- The engine installed on this machine has TIER 0 emissions.

Figure 25

4.14 - Working with fuel

- Be very careful when refueling the machine, since the fuel is flammable. Do not refuel with the machine turned-on, nor smoke nearby, and avoid any sparks or open flames.

4.15 - Using proper tooling

- Always use the proper tool for the specific maintenance procedure. To loosen or tighten hardware, use the correct sized tool. The use of improvised tools can be a threat to safety.

4.16 - Cleaning surfaces to be welded or heated

- Remove paint in weld area. Clean-off about 100 mm around area to be affected by the heat. If the paint cannot be removed, use the proper protective breathing equipment, and weld in a well ventilated area.
- If paint remover or thinner is used, wash-off the area with soap and water to remove any paint remover residue.

4.17 - Avoid fluids under high pressure

- Fluids under high pressure can penetrate the skin causing severe injuries.
- Avoid dangerous situations by releasing the hydraulic line pressures or other lines before disconnecting them. Tighten all connections before applying pressure.
- Protect your hands and other body parts from fluids under high pressure.
- Only specialized technicians can perform maintenance on

Figure 26

air conditioning refrigeration systems, since improper maintenance can result in serious injuries (consult your local Stara dealership).

- In case of an accident, immediately seek medical assistance. Any fluid which penetrates the skin will need to be surgically removed in a few hours, so as not to allow gangrene to set in.
- Do not disconnect any hydraulic hoses while under pressure. Use safety equipment like, gloves and protective eye glasses, all the while being very careful to perform maintenance on the hydraulic system. Injuries caused by fluids need to be treated immediately by medical personnel.
- Maintain components such as, hoses, connections and clamps in good working conditions, thus avoiding leaks.

4.18 - Emergency procedures

Figure 27

- Be ready for any fire conditions. Verify that the fire extinguisher is properly mounted, fully loaded and within valid expiration dates as set by the manufacturer, and as specified on its certification decal (Figure 27).
- In case of a fire, or any other hazardous situation detrimental to the operator, he should seek shelter in a secure place as quickly as possible.
- Never operate a machine which does not have a fire extinguisher or any other safety equipment. Maintain them in proper working conditions.
- Keep all emergency phone numbers like doctors, ambulance services, hospitals and fire department near your phone.

PERIGO / PELIGRO / DANGER / ОПАСНОСТЬ
EM SITUAÇÃO DE EMERGÊNCIA, QUEBRE O VIDRO.
EN SITUACIÓN DE EMERGENCIA, ROMPA EL VIDRIO.
IN CASE OF EMERGENCY, BREAK THE GLASS.
В ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЯХ РАЗБИТЬ СТЕКЛО.
9100-5755
Figure 28

- In case of an emergency and you cannot exit through the cabin door, release the safety hammer and break a window to safely exit the cabin (Figure 28).
- If you perceive intoxication symptoms such as, weakness, headache, vertigo, blurred vision, anxiety, stomach aches, diarrhea, nausea and vomiting, irritations of the throat, nose and eyes, coughing, teary eyes, altered urine coloration and consistency, and also fainting spells, seek immediate medical assistance and bring along the pesticide container with you. As an emergency medical assistance for the victim in case of vomiting, have them be seated. Never allow them to drink milk or alcoholic beverage. Keep them calm and in a comfortable position while awaiting for medical assistance.
- Never attempt to extinguish a field fire, since you will be using pesticides and these products are flammable. Seek a safe place and notify the fire department.

4.19 - Using the safety belt

Figure 29

- Always use the safety belt when operating the machine, in an effort to minimize injuries in case of an accident.
- In case that a belt component like the buckle, lock-tap or latch show signs of being damaged, replace the whole assembly. An annual inspection of the safety belts should be done, and whenever a problem is identified, replace the parts only with original Stara parts.

4.20 - Clean water reservoir

Supplies a clean water source for field wash-down in case of an emergency when dealing with chemical products. Should you come into contact with these chemicals, wash-up and seek immediate medical assistance.

WARNING!
This water is not safe for human consumption.

Figure 30

4.21 - Safety procedures when inflating tires

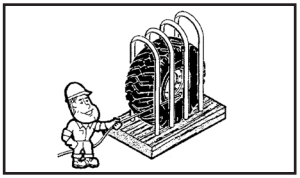


Figure 31

- Never try to refill a tire which is completely flat. If the tire has lost complete pressure, contact the nearest tire specialist.
- Always try to use a protective cage or safety guard when trying to fill a tire (Figure 31).
- Never weld or heat-up an wheel and tire assembly. Doing so could result in a tire blow-out.
- In case of a punctured tire, deflate it to remove the object responsible for the puncture. The work to dismount and remount the tire should be done solely by a qualified professional.
- Any changes to the rim balancing can cause the tire to blow-up. For that reason, dismount the tire before making any repairs to the rim.
- When changing a tire or adjusting the wheel base spans, place the machine on an even firm surface, with the engine turned-off and the parking brake applied. Preferably with the solution reservoir empty, raise it with the help of a hydraulic jack (supplied with the machine). For guaranteed safety, besides the jack, use wheel blocks or sawhorses which can handle the machine's load.

When inflating a tire, follow this information:

- Use an appropriate air hose, long enough to reach work area, having an air gun with a dual valve and an incremental metering gauge with which to measure and see the pressure reading.

- Place yourself behind the specified safety line, along with any other personnel before beginning to inflate the tire.
- Never inflate the tire to pressures higher then specified.

4.22 - Avoid contacting hot surfaces

- Performing maintenance on the machine or its accessories with the engine running can result in serious injuries. Avoid exposing or contacting your skin to vapors or hot exhaust parts, the engine, hydraulic oil reservoir and hoses (Figure 32)
- Parts and gas flows heat-up during the job. The exhaust gases and the exhaust parts reach high temperatures, sufficient to cause burns, flare-ups and the melting of common materials.

Figure 32

Figure 33

- Beware of vapor jets and hot water. The radiator remains under constant pressure when the engine is hot. Remove the cover with extreme care, and only with a cool (Figure 33).

4.23 - Handling the battery

- Battery fumes can explode, thus keep it faraway from open flames, use a voltmeter to verify the battery charge, never connect the two posts together with metallic objects.
- During maintenance remove the negative terminal (-) first from the battery and when reinstalling, mount the ground lug last.
- To avoid accidents handle the battery according to the manufacturer's specifications.
- Should your eyes have contact with acid, wash them out thoroughly with water for at least 15 minutes. Seek medical assistance immediately.
- In case of acid ingestion, do not induce vomiting, drink large amounts of water or milk, but do not exceed 2 liters. Seek medical assistance immediately.
- Remove and isolate the battery cables when welding on any part of the machine, thus avoiding any possible damages to the battery or accidents.
- Topping-off the battery with distilled water is not required since the battery is sealed.
- Inspect the battery posts for any oxidation (patina). In case of oxidation, clean the posts. It is recommended to clean the posts every 100 hours.

4.24 - Caring for the cabin and air conditioning filters

- Avoid exposure to chemical products.

WARNING!
Exposure to chemical products, can cause sickness or death. To reduce the risk of exposure to chemical products, always use Personal Safety Equipment, as specified by the manufacturer on the chemical product label, or consult the job safety norms.

- Only qualified operators are allowed to apply chemical products.
- During operations maintain the cabin closed, thus avoiding any contamination.
- Replace the cabin filters often. This will be dependent on job conditions for each machine. Replace the filter on a maximum of every 250 hours or once a year, whichever comes first. Always use Stara original filters, available at your local Stara dealership.
- Never transport chemical products inside the cabin.
- Do not enter the cabin with contaminated items, clothing, shoes or PPEs.
- Maintain the interior of the cabin clean.
- While operating the machine, use all PPEs as indicated by the products manufacturers.
- The air conditioner maintenance should be done in an open environment and well ventilated. The refrigerant fluid should never be exposed to temperatures above 40°C.
- Do not exceed 900 grams of gas on the air conditioner compressor.

4.25 - Operational safety

1	Anti-skid catwalks and steps	Giving adherence so that the operator will not slip.
2	Forward and rear emergency blinkers	Alerts on-coming and forward going traffic of your presence.
3	Clean water reservoir	Available as a reserve source of clean water for cleaning the spray system in the field and as an emergency in cases of chemical product exposure.
4	Ground level reservoir filling	Allows the operator to add chemical products from ground level, thus avoiding spills or splashing.
5	Handrails	Avoids accidental slipping on the machine or ladder steps. Assists while climbing on the machine or while on the catwalks.
6	Handrails with baseboards on the catwalks	Offers extra safety when walking on the catwalks.
7	Engine protective cowlings/hood	Avoids any direct contact with the engine, since there is no exposure to hot or moving surfaces, also restricting start-up when the hood is open.
8	Internal emergency exits	Exits on the right, left and cabin front sides, by using the emergency hammer to break the windows.
9	Cabin	The cabin is equipped with a seat belt for the operator, none available for the auxiliary seat.
10	Windshield wipers	Used to clean the front windshield.
11	Rearview mirrors	Used to give a clear full view around the machine.
12	Extinguisher	Used to extinguish any fire situations.
13	Frontal, rear and side lights	Allows the operator to have a clear night vision around the machine.
14	Warning beacon	The warning beacon serves as a means to warn others regarding the machine.
15	Clean water barrel	Clean water reservoir for cleaning parts and hand washing.

Table 2

NOTE!
In addition to the safety features described on the previous page, other components and systems, safety signs on the machine, safety messages in the operator's manual and elsewhere, along with the precautions and concerns of a skilled operator, these contribute to the safety of operators and others who are near the machine.

4.26 - Operator cautions when handling toxic products

The Health Department Agency of Brazil, has subdivided toxic products into four groups. These classifications are fundamental in understanding the toxicity of a product, and their acute side effects. See below the toxicological classes and their respective identifying colors which are placed on their containers.

PERIGO / PELIGRO / DANGER / ОПАСНОСТЬ
PRODUTOS TÓXICOS
PRODUCTOS TÓXICOS
TOXIC PRODUCTS
ТОКСИЧНЫЕ ВЕЩЕСТВА
UTILIZE EQUIPAMENTOS DE SEGURANÇA ADEQUADOS PARA O MANUSEIO.
UTILICE EQUIPOS DE SEGURIDAD ADECUADOS PARA EL MANOSEO.
DURING HANDLING, USE APPROPRIATE SAFETY EQUIPAMENT.
ВО ВРЕМЯ РАБОТЫ, ИСПОЛЬЗОВАТЬ СООТВЕТСТВУЮЩЕЕ ОБОРУДОВАНИЕ ДЛЯ БЕЗОПАСНОСТИ.
Figure 34

CLASS I	Extremely toxic	Red band
CLASS II	Highly toxic	Yellow band
CLASS III	Moderately toxic	Blue band
CLASS IV	Low toxicity	Green band

Table 3

4.27 - Safety measures

- In order to work on a machine and its equipment, the operator should have been trained and duly qualified, and must have read all instructions contained in this manual.
- Always maintain the machine in good working conditions, performing all indicated maintenances, as related to frequency of use and products used.
- Be aware of the panel indicators. In case of any fault indications, stop the machine, identify and correct the problem immediately.
- Its recommended that all maintenance services always be done by duly trained and qualified professionals, with the engine turned-off and the parking brake applied.
- Periodically inspect and replace filters and lubricants, in order to obtain maximum engine performance and to avoid operational damages, being sure to always only use filters and lubricants indicated in this manual.
- Periodically clean the radiator fins (using only air), in order to avoid the built-up of dust, leaves and seeds. These could cause engine over-heating and wear and tear.
- Always handle agricultural chemicals in a well ventilated area.
- While performing any maintenances on the machine or refuelling, do not smoke and immediately clean-up any oil or fuel spills.
- Do not smoke, nor install any electrical devices near flammable products, be it on the machine

or in storage.

- Be extra careful when performing maintenance on the machine and there is a need to turn-on the engine. Avoid going near moving parts, and be careful with loose clothing and long hair.
- When working in areas like the engine, nozzles, hydraulic parts, maintain the area clean and, do not use cotton rags or any other materials that could leave a residue, which could cause system clogging.
- Failure to perform maintenance and operation by untrained persons, could cause serious accidents, besides damages to the machine.
- Should you have any questions, seek technical assistance in order to perform maintenance.
- Maintain the service area clean and dry.
- Before starting maintenance procedures and adjustments, turn-off all power sources (electrical, hydraulic), turn-off the engine operate the controls in order to relieve the hydraulic system pressure.
- Remove and isolate the battery cables when welding on any part of the machine, thus avoiding damages to the battery and, or accidents.
- Securely support any parts of the machine which need to be lifted in order to perform maintenance.
- Before turning on the cabin air-conditioner, turn-on the fan. Whenever that the air-conditioner is turned on, the fan should be also. Do not expose the air-conditioner to any type of open flames. Should there be a leak, the refrigerant gases become lethal.
- Never weld on the machine unless all the battery cables have been disconnected.
- Use all personal safety equipment (PPEs).
- Do not allow unprotected persons or animals to be present while handling or applying the product. Keep them away from area which have been treated.
- Read and follow closely the instructions regarding adjustments and treatments contained in this manual, in order to achieve desired results, avoid waste and the misuse of the machine.
- Eliminate any type of leaks thus avoid product waste, treatment skips and environmental contamination. Should that occur, make all efforts to contain it, so that it will not reach any rivers or lakes, advising the local authorities along with the manufacturer of the product applied.
- When filling or re-filling the reservoir, respect all level indications, thus avoiding that the solution spills over and contaminates the environment.
- Respect the pesticide dosages as recommended by the manufactures. Any modifications to the prescribed dosages could cause serious damages to both the crop and the environment. Remember also that, each crop has its own specific recommended product.
- After ending the work with the pesticides, remove your PPEs and take a shower. The clothing used needs to be washed separately from common use clothing.
- Never use or bring equipment or clothing that has been contaminated inside the cabin of self-

propelled unit.

- Never attempt to unclog spray nozzles by blowing into them with your mouth, since the spraying system contains chemical residue. That would be a quick to way to become contaminated.
- Keep all pesticides, fuel, fluids, tools and parts properly stored in a safe place where there are no risk of accidents.
- Follow all manufacturer's recommended storage instructions regarding fertilizers and pesticides.
- Be careful when transporting pesticides. Do not transport them with food products or feed. Do not bring them into the cabin.
- Follow all application standards, as indicated by the manufacturer.
- When choosing a spray nozzle, take into consideration the type of pesticide being used (consult the manufacturer), and the climatic conditions.
- Use the spray solution for the first pesticide container wash-out while in the product mixer. Afterwards, do a triple-wash using clean water, per the agricultural pesticide manufacturer's instructions.
- Before discarding the empty and clean containers, make them totally useless by cutting holes on their bottoms. Next, store them in a proper place so that they can be collected and recycled.
- Should you make contact with the product, wash the area with running water for about 15 minutes.
- Keep the service area clean and dry.
- Maintain the electrical system in good working conditions, avoid battery tension variations problems, short-circuits and poor connections.
- When filling the machine, seek the proper places designed with this end in mind, or use refilling vehicles (for example, tanker trucks).
- Check for climatic conditions before spraying. It is recommended to spray in winds between 3 to 7 km/h, temperatures between 7 to 30°C and with a relative humidity above 55%. If the winds are above 10 km/h, it is not recommended to apply, since the pesticide will not reach the crop, and will only pollute the environment, maybe even reaching water sources and animals. Do not spray during the hottest part of day, nor against the wind direction.
- Keep the fuel tank filled after finishing the job, thus avoiding any water condensation built-up. Water contamination of the fuel, can cause major damage to the fuel pump and fuel injectors.
- Do not smoke inside the cabin.
- Do not use the hood opening as a hand support when closing the hood.
- Modifications or adaptations to the design of the machine can affect its useful life span and, will nullify your warranty, thus, these modifications can only be implemented with proper the authorizations from Stara.
- Clean all nozzles and calibrate the flowmeter regularly, thus limiting possible errors with the automated flow rate controls.

4.28 - Topper 5500 job/maintenance safety measures

Observe the following recommended safety instructions when working with the Topper 5500 Controller.

Read the Topper 5500 instruction manual when using it for the first time. Should you have any questions regarding any items at all, contact the Stara after-market sales department to clear-up your questions.

- During distribution systems repairs, turn-off the Topper 5500 console.
- Never start the self-propelled unit with the Topper 5500 controller turned-on, due to the fact that the current tension variations caused by the start-up could damage the equipment.
- Calibrate the sensor pulses by 100 m after changing a tire or wheel assembly.
- Always maintain the self-propelled electrical system good working condition, thus avoiding any possible battery tension variations, short-circuits and poor connections.

4.29 - Proper waste disposal

Figure 35

It is illegal to pullout channels, rivers or the soil. Improper waste disposal is a threat to the environment and the ecology.

- Use containers to dispose used oils;
- Use leak and spill proof containers, when draining used fluids.
- Improper waste disposal is a threat to the environment and the ecology. Potentially harmful waste products used on Stara's machines include the following, oil, fuel, refrigerant fluid, brake fluid, filters and batteries.
- Do not dump waste on the soil, sewer systems and waterways.
- Drain water or reservoir solution of the sprayer at appropriate locations, faraway from people, animals, or even places where the product could harm the environment.
- Air conditioning liquid refrigerants can damage the earth's atmosphere. Government regulations may demand for a central air conditioning maintenance center, in order to recover and recycle the refrigerant liquids used on the air conditioner.
- In order to know the proper manner to recycle or to dispose of waste, which are the correct methods to discard oils, filters, tires and electronic equipment, seek your local waste recycling center or your local Stara dealership.

4.30 - Access points

1	When boarding the machine, it should only be done by using the front ladder, and only when it has been totally lowered.
2	To gain access to the solution tank cover, this should only be done via the catwalk over the hydraulic reservoir.
3	To gain access to the rear catwalk, this should only be done by using the rear ladder, and only when it is totally lowered and the machine is parked.
4	When performing maintenance on the engine, you must use the rear catwalk, and must be done by qualified personnel.
5	When performing maintenance on the battery or the heat-exchanger, these must be with the use of the ladder or the catwalk when necessary.
6	To maintenance the booms carriage frame, it should be done with carriage frame as closest to ground as possible, and use the ladder or the external auxiliary catwalk when necessary.
7	When you have accessed the rear catwalk, do not open or close the booms.

Table 4

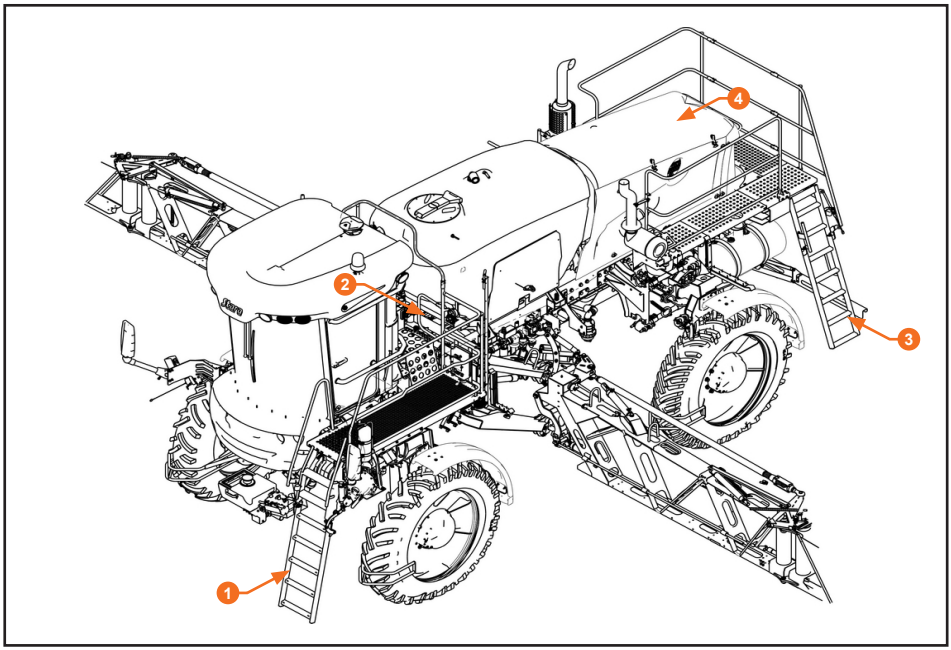


Figure 36

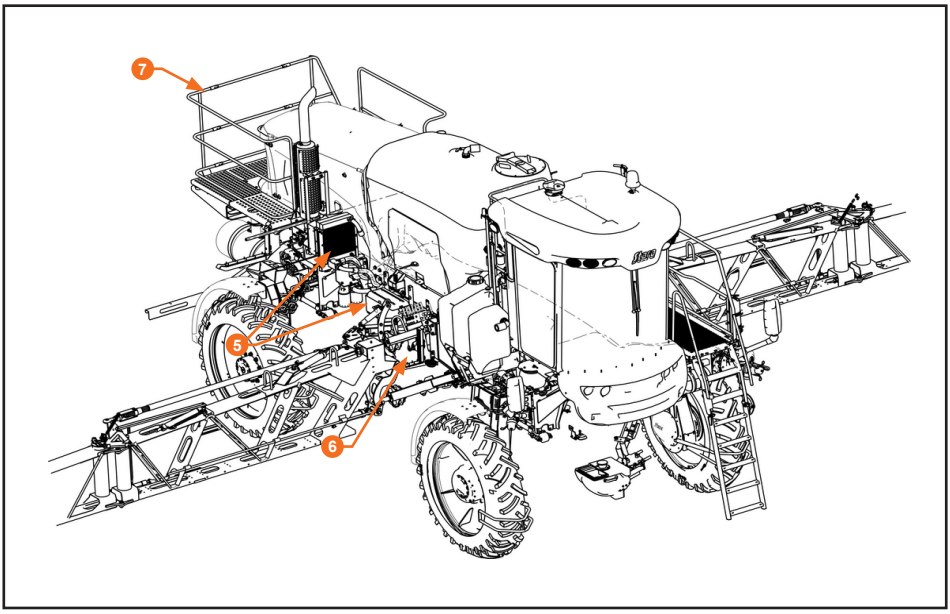


Figure 37

5 - COMPONENTS

5.1 - Engine

The engine equipt with the Imperador 3100 is the MWM model type with turbo diesel After-cooler 6.10 TCA with 215 HP.

CAUTION!
Carefully read all instructions regarding the use, maintenance and safety in the MWM engine manual.

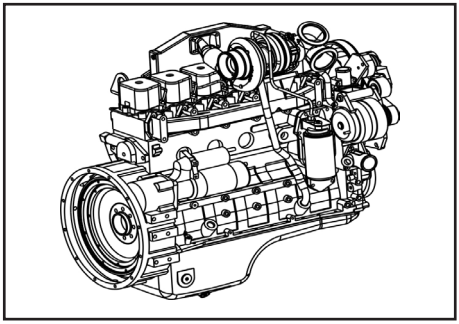


Figure 38

5.2 - Protective additives for the fuel system

- It is recommended the additive treatment A550 to clean and protect the engine fuel system and injectors during mandatory programmed check-ups and the technical delivery.
- This process has an anti-bacterial, anti-oxidant and an corrosion inhibitor process, whose objective is to clean and protect the fuel system. This treatment should be applied to both new

and used field machines.

The objective of this treatment is to protect the whole fuel system of the machine, from the fuel tank to the fuel injectors, from sludge, oxidation and paraffin. Through the film coating of the whole fuel system, it will be coated and protected.

NOTE!
This treatment last for 6 months or 250 hours, depending on which comes first.

- Inspect and/or replace the fuel filter(s), should they have deteriorated or are come to the end of their useful life;
- With the main fuel tank at between ¼ and ½ full, add 0.5% of the total capacity of the tank with Actioil A550. For example, if the tank is rated to 500 liters, add 2.5 liters of Actioil A550;
- Fill the fuel tank so that there is a mixing between the product and the fuel, and so that the product can act upon all the walls of the tank;
- Turn-on the engine and let it run for about 15 minutes, so that the treatment can reach the whole fueling system;
- Repeat this process only every 6 months or every 250 hours, depending on which one comes first;
- This treatment should be done on the fuel tanks on the farms, with the objective to dissolve all impurities and to eliminate any possible water found in the storage tank(s). Doing so will avoid any form of bacterial contamination and the corrosion of the storage tanks. The life expectancy of this treatment is of one year.

5.3 - Wheel motor and reducer gear

The wheel motor and reducer gear of the Imperador 3100 are made by Rexroth (Bosch). These work at high torques and have independent rotation in each wheel.

5.3.1 - Wheel motor

Motor with variable axial pistons, used with closed-loop transmission systems. Simple assembly when mounting mechanical reducers. Internal gear shifting valve, two position type, driven by a hydraulic pilot. Cooling valve with Integral housing.

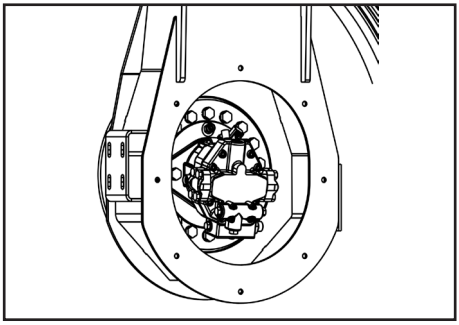


Figure 39

5.3.2 - Reduction gearbox

Reducer gearbox used on wheel transmission applications, with three stages and a reduction of 26.4:1. Integral parking brake. Has heavy duty roller bearings for heavy load applications.

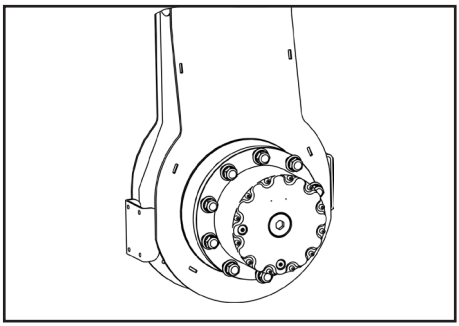


Figure 40

5.4 - Traction pump

Variable displacement piston pump, used on close-circuit transmissions. Pump with a variable bidirectional mechanical flow control, equipt with two high-pressure valves, used to protect the system from overloading. Integral load pump with a protection valve. Integral valve type DA, which adjusts the transmission pump flow mechanically on steep hills, reducing the machine's speed and the power consumption of the diesel engine, keeping the machine from dying.

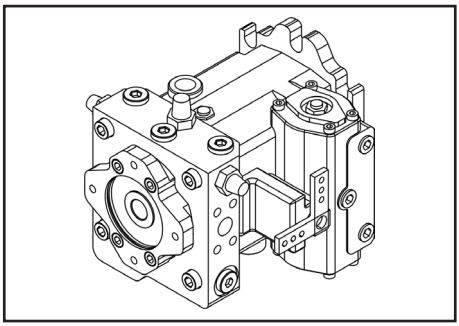


Figure 41

5.5 - Triplex pump

The triplex pump controls three different functions independently. The first controls the spray system, the second controls the steering and the third controls the booms.

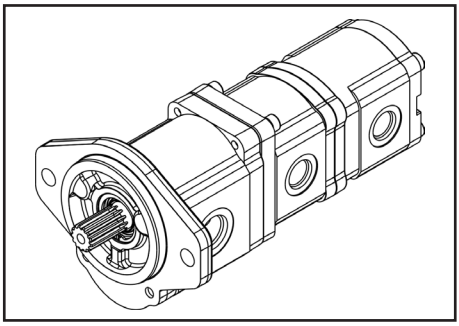


Figure 42

5.6 - Hydraulic oil reservoir

The Imperador 3100 has two hydraulic oil reservoirs. One of them (Figure 43) has the capacity for 140 liters of the oil type ST OIL 68, used solely for the machine's transmission operation, and the other (Figure 44) has a capacity for 80 liters of the oil type ST OIL 68, which supplies for the operation of the booms, steering and the spray pump.

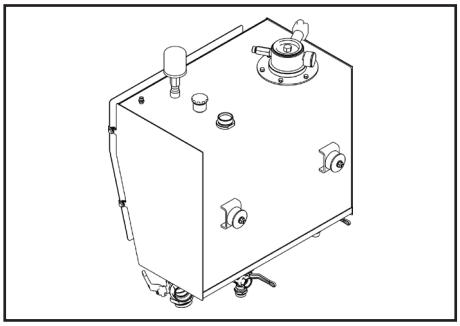


Figure 43

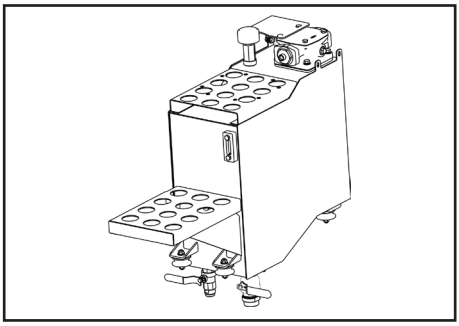


Figure 44

5.7 - Transmission filter

The self-filtering system of the transmission maintain the hydraulic system free of impurities, extending the useful life span of the pump and wheel motors.

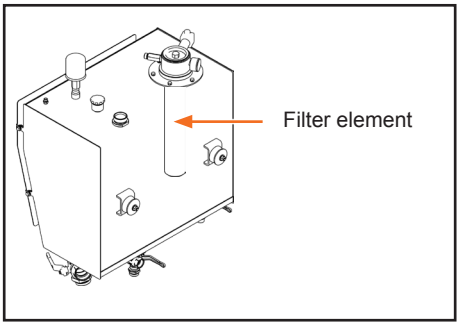


Figure 45

5.8 - Spray pump

The spray pump is a centrifugal type, made by Hypro having a capacity of 430 l/m. Which supplies a large volume of water and low pressure demand on the system, which varies from 2 to 8 bar. Due to its characteristics, when choosing spray nozzles and a medium job speed, these need to be compatible.

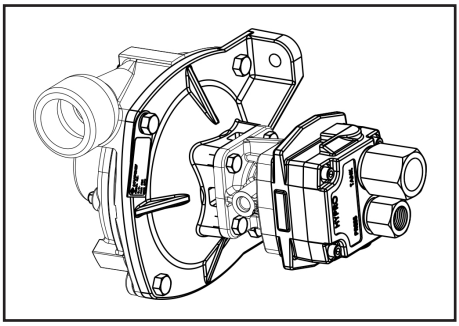


Figure 46

WARNING!
Never operate without water, doing so will create major problems for the internal pump components.

5.9 - Spray and sectional valve controls

The control rate to be used is done by the adjustment valve (A), which controls the solution flow rate to be used. It is located on the spray controller (Figure 47).

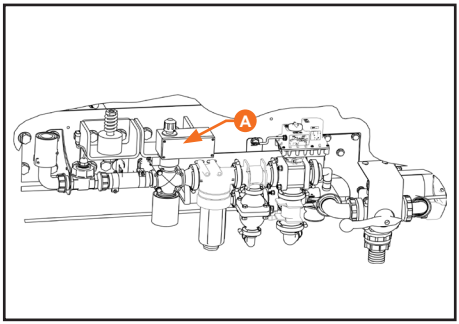


Figure 47

The control rates and adjustments to be used, are done by means of the information collected and passed on to the controller, which compiles the data and, sees the demand for it either to, increase or decrease the solution volume.

The spray opening is done by the sectional valves (Figure 48 and Figure 49), which are located on the booms. The sectional valves have a calibrated return and a third return.

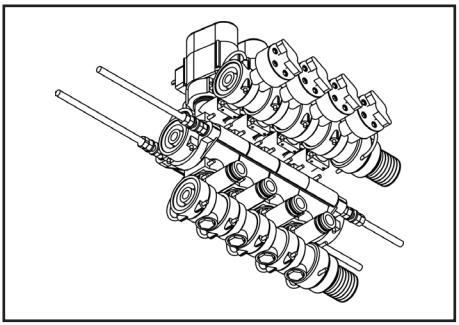


Figure 48

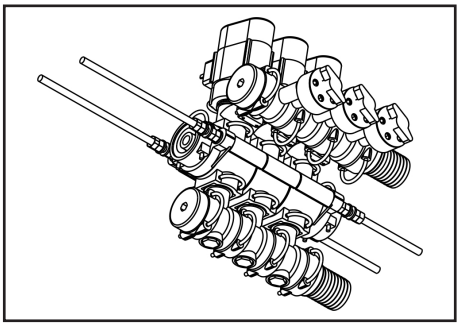


Figure 49

The function of the calibrated return is to maintain a constant pressure between all boom sections, even when a section closes or opens, by using a medium pressure on the end being used. The sectional valves have five pre-adjustments available, which can be preset for nozzles with different nipple sizes. It is recommended that the calibrated return be done every 250 hours, as explained on item 7.9 on page 51.

The third return is used to eliminate the remaining pressure in the circuit when a section is closed, returning this residual pressure into the solution reservoir.

5.10 - The high pressure control valve

The function of this valve is to avoid pressure spikes which can damage the spray system. It is factory preset at a pressure of 10 bar. This pressure rating should never be changed.

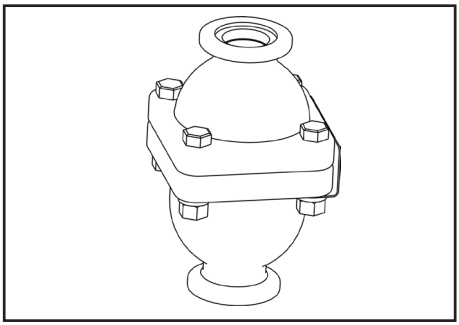


Figure 50

5.11 - Product mixer

The product mixer reservoir/container washer, has a capacity for 30 liters. It facilitates the handling of a large amount of chemicals, besides the proper handling of the containers.

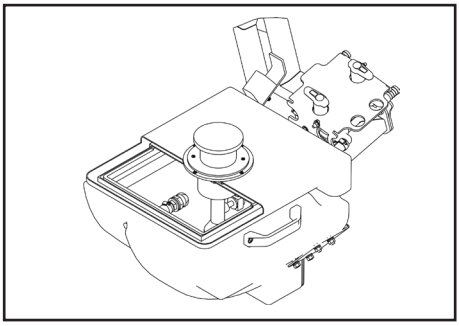


Figure 51

5.12 - Spray booms

The operation of the booms is done from within the cabin, by the operator who uses an electro-hydraulic actuation. The booms work using a revolutionary, Stara patented system, which allows the machine to work on the most multi-faceted terrains.

5.13 - Solution tank

The solution tank of the Imperador 3100 has a capacity of 3100 liters. It is formed of rotomolded plastic. The solution agitation is done by 2 hydraulic agitators, positioned on the lower part of the tank, having a capacity of up to 200 l/min.

5.14 - Cabin

The cabin of the Imperador is spacious and pressurized. It is equipped with an air-conditioner which has a charcoal activated filter. Besides all that, it is very comfortable. The seat has a pneumatic shock absorber, with height and posture adjustments. The steering is also adjustable, both in the height and seat distance.

5.15 - Battery

The battery has a capacity of 150 amperes at 12 V. Its cells are sealed, offering higher endurance to vibrations during long job travels. It is totally maintenance-free without the need to add water, plus without the risk of impurity contaminations.

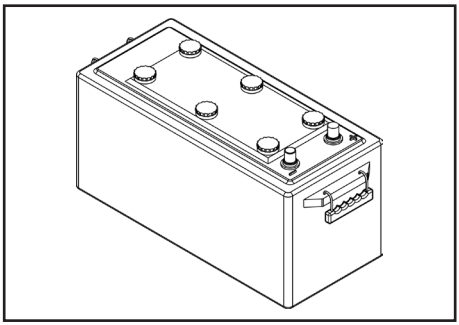


Figure 52

5.16 - The front ladder

The ladder is electrohydraulically driven in conjunction with the parking brake application, or be it, when the parking brake is applied the ladder drops/opens and when the brake is released the ladder retracts/closes. Before operating the ladder, make sure that there are no obstacles which may collide with the operation of the ladder.

5.17 - Pneumatic suspension

The suspension system is an active pneumatic type, which has four pneumatic springs whose pressure is adjusted individually by control valves, their air supply comes from an air compressor which is driven by the engine, also it is hooked-up to an air reservoir, jointly these offer the best stability, smoothing-out any impacts, twisting and vibrations during the job, thus guaranteeing the machine and its components a long useful life.

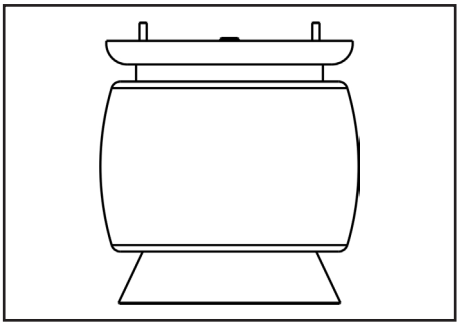


Figure 53

ATTENTION!
Regarding the maintenance of any items or components, review the maintenance schedule tables on page 83 and page 84.

6 - START-UP CHECK LIST

6.1 - Initial check-up

The machine is operationally ready. But, during the first hours the following items need to be checked:

- The steering wheel pivot nut tightness (Figure 54);
- Cabin hardware tightness (Figure 55 and Figure 56);
- Solution tank hold-down hardware tightness (Figure 57);
- Main front axle (Figure 58);
- Follow the machine and check for leaks;
- Closely monitor the machine's temperatures, such as the transmission and work oil, also engine cooling fluids;
- Check for leaks on the pneumatic system;
- Check the levels on the hydraulic oil reservoirs. These should be at the half-way mark, as shown on item A of Figure 59 and item A of Figure 63. Should the levels be below those shown, top-off using fill port 1 (Figure 59) and fill port 2 (Figure 63).
- Fill the diesel reservoir using the inlet shown on Figure 60. If you notice the need to use the diesel transfer control valve, follow these steps:

  To fill, open the valve per Figure 61, after the fill-up close the valve, restricting the diesel flow so that the transfer time is slower, as per Figure 62.
- Check the tire pressures according to Table 7 on page 82.

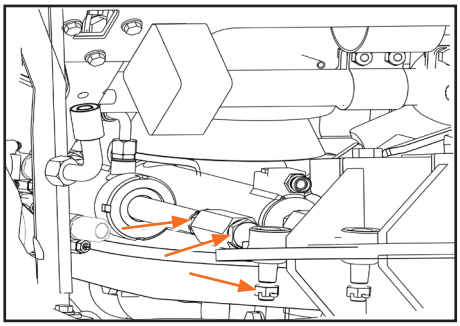


Figure 54

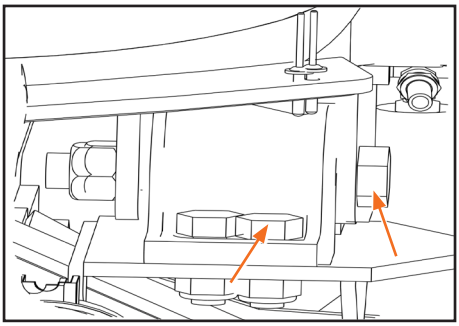


Figure 55

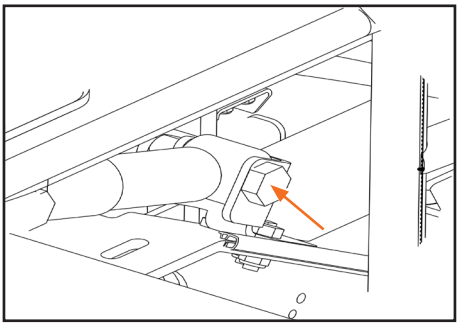


Figure 56

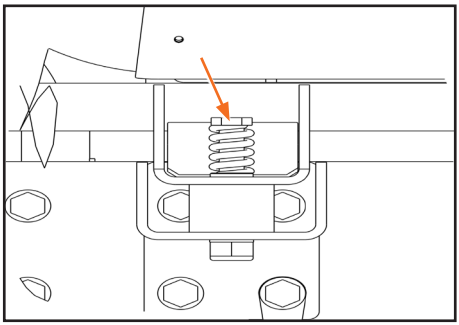


Figure 57

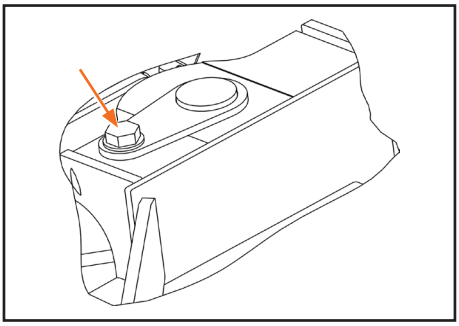


Figure 58

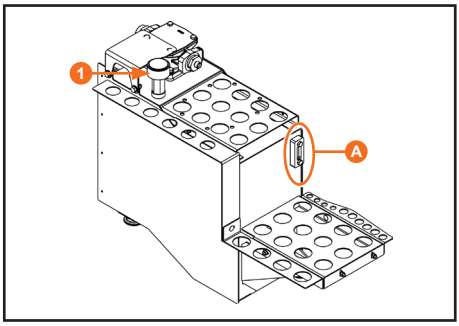


Figure 59

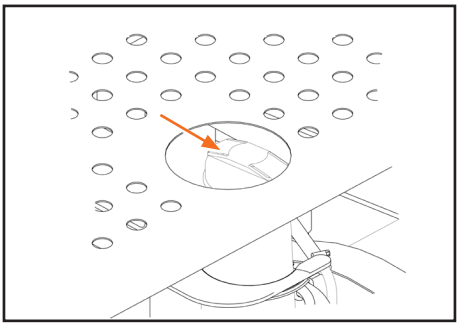


Figure 60

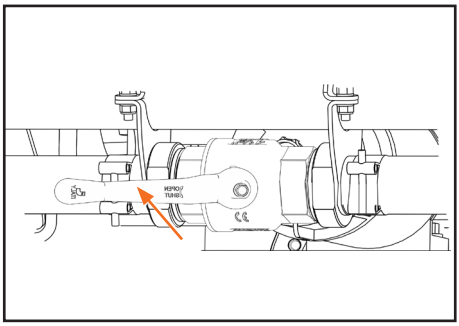


Figure 61

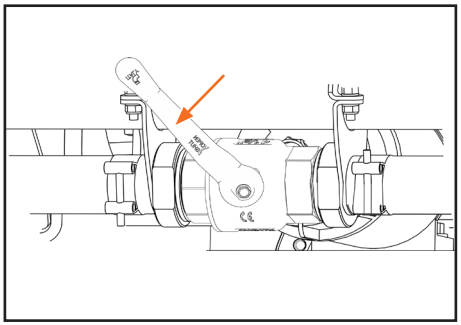


Figure 62

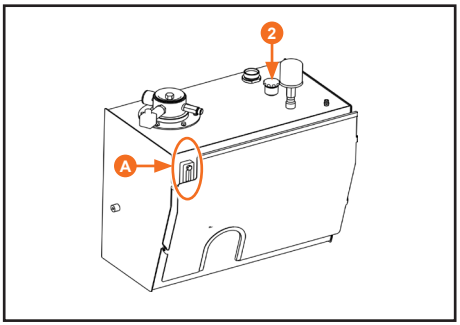


Figure 63

6.2 - Driving the machine

- With the engine running, release the parking brake. Automatically the ladder will be retracted. Be careful that the ladder does not hit anything. Be careful after releasing the brake on the machine, since now the machine is free to move on its own depending on the slope of the terrain;
- Accelerate the machine to the desired rpms. The rpms should be above 1350 rpm;
- Slowly move the control lever forward, so that the machine moves forward. Continue moving the control lever forward until you reach the desired speed;
- In order for the machine to stop or brake, the control lever must be returned to the center position. It should be done so slowly;
- To reverse the machine, and with the control lever in the neutral position (center position), pull back on the control lever;
- When the machine is driving in reverse, it will emit a warning signal, thus alerting all in its surrounding area.

6.3 - Cold start-ups

In cold regions where the temperature falls below 0°C, it is advisable for the machine to run at low rpms for about 10 minutes while parked. Afterwards, make some short movements with low loads for about 1 minute.

After following these procedures, now the machine is ready for the job.

7 - OPERATION AND ADJUSTMENTS

7.1 - Diesel engine

The engine has a break-in period, which runs for the first 50 working hours. It is important that, during this period, the engine is not subjected to the high rates of acceleration or maximum torques, thus assuring its durability, job safety and economy.

Some recommendations must be followed during the break-in period, to guarantee engine life:

- Check the engine oil level;
- Check the engine cooling system water level;
- Avoid forcing the engine at lower rpms;
- Avoid over-loading the engine while the normal operating temperature has not been reached;
- Avoid over-loading the machine;
- Avoid turning-off the engine when at high rpms;
- Avoid submitting the engine to low rpms for long periods;
- Avoid running the engine in lower gears for prolonged periods;
- Engine working temperatures should be kept between 75°C and 95°C;
- Maintenance and lubrication standards should be rigorously followed.

Regarding the fuel system, always use clean fuel, water-free, free of suspended particles, sand, impurities, etc. The fuel must be centrifuged as per Brazilian standard CNP-04.

Daily drain the fuel system through the sediment fuel filter.

Before starting the engine, check the following items:

- Water level;
- Fuel level;
- Engine oil level;
- Air filter element cleanliness.

Follow all operation and maintenance instructions:

- Use clean and centrifuged fuel and recommended oil lubricants;
- Use only original spare parts and filters;
- In the event of any irregularities, seek an authorized dealership;
- Do not allow any 3rd. party engine repairs, for this will void out all warranties;

- Be sure that the engine is cool, before doing any maintenance or servicing the engine;
- Disconnect the negative battery cable before performing any maintenance work.

NOTE!
Carefully read the MWM engine manual, which accompanies the machine.

7.2 - Wheel tread gauge adjustments

7.2.1 - Mechanical tread gauge

To adjust the wheel tread gauge, park the machine on level terrain, with the parking brake applied proceed by following the steps below:

1 - Loosen the axle by loosening the clamp screws A and B (Figure 64);

2 - Position the jack at point D, as per Figure 64;

3 - Hook-up the hydraulic hose of the jack at point C on Figure 67 and the electric control (Figure 68). Verify that the valve is at position A (Figure 65). With the machine turned-on, press the electric button on the remote control (Figure 68) and the wheel assembly will be raised;

4 - Next, turn the valve to position B (Figure 65), activate the electric control and open the wheel tread spacing using the cylinder (Figure 66) to the desired spacing;

5 - Retighten the gauge screws with the machine still raised. Start tightening the screws (point B on Figure 64), staggering the screw tightening pattern between the upper and lower screws. Next, tighten point A in the same manner. After the first day of work, and after the tread gauge has been adjusted, retighten the screws according to Table 13 on page 94;

6 - Repeat the procedure on the other side, moving the gauge spacing cylinder.

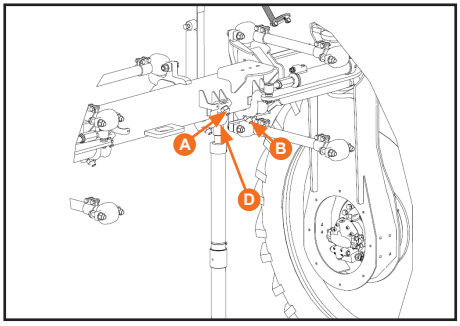


Figure 64

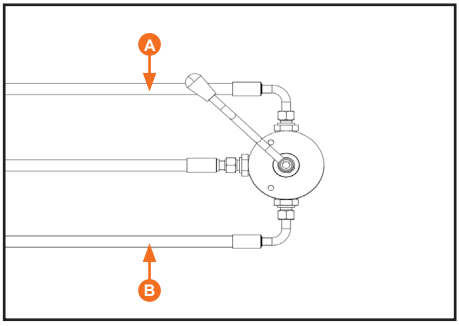


Figure 65

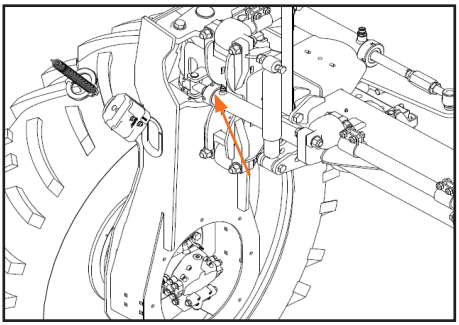


Figure 66

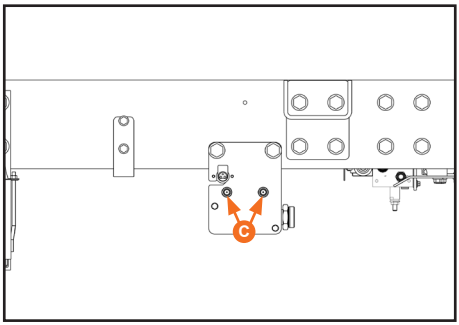


Figure 67

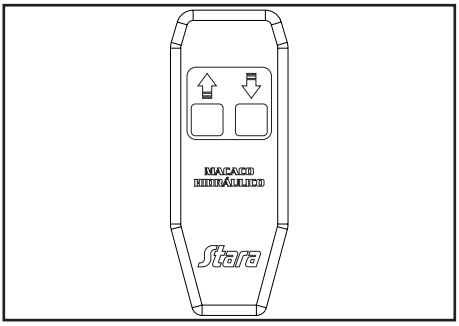


Figure 68

7.2.2 - Hydraulic tread gauge spacing

7.2.2.1 - Adjusting gauge spacing gap

- For a good working hydraulic tread gauge system, use the system adjustment the slide bushings, which will eliminate all the assembly gaps, plus will restrict any overtightening.

To adjust, follow the steps below:

- Position the jack on point D as per Figure 64;
- Raise the machine using the jack, hooking-up the hose C (Figure 67), position the jack according to Figure 64, connect the jack and activate the jack with the controller (Figure 68);
- In case you do not have a factory jack, use some other type of jack, placing it on the same point D, as per Figure 64;
- Loosen the upper slide plate using the C and D screw (Figure 69), until the whole axle can rest on the upper face of the axle cover;
- Always start tightening at the external lower bushing (E) (Figure 70) of the wheel assembly and tighten the side (F);

- Repeat the previous step, tighten the internal bushings (G) on the lower part and side (H) sequentially (Figure 70);
- After all have been tightened, loosen the four bushing a ¼ turn until the stop (I) can be tightened. As shown on Figure 71, tighten the stop screws;
- After the bushings have been tightened, tighten the wheel assembly slide plate until it firmly touches the axle, and that the screws C and D (Figure 69) will cause a friction on it;
- Grease the identified points on the wheel assembly in a way that they will remain lubricated.

NOTE!
Inspect the adjustments every 250 hours, or whenever you notice a looseness, and retighten according to the previous steps.

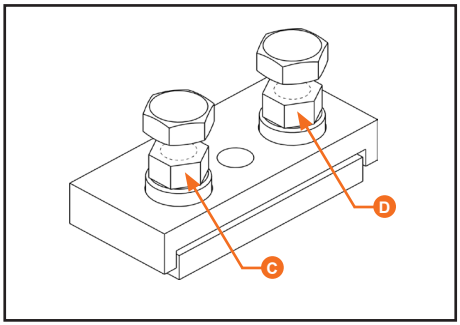


Figure 69

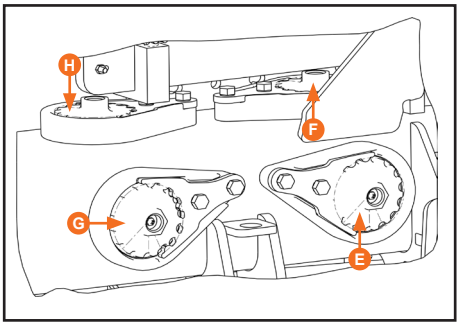


Figure 70

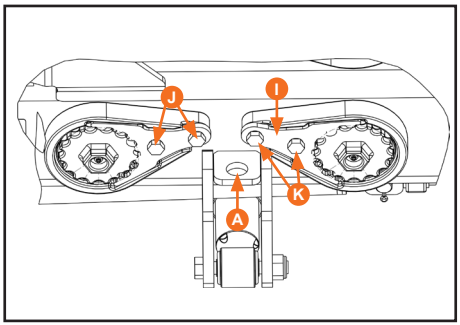


Figure 71

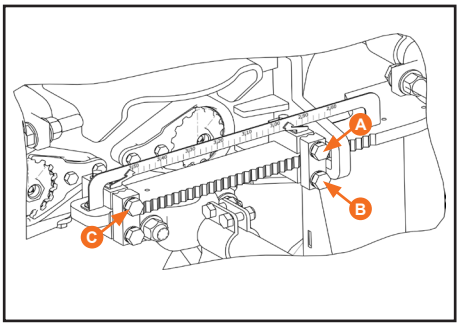


Figure 72

7.2.2.2 - Adjusting the stops

After the axle gaps have been adjusted, select the desired tread gauge measurement, adjusting the stops as per the items below:

- Loosen the screws A and B as per Figure 72, and push the stop to the desired measurement;
- Tighten the stop screw, as per the torque on Table 13 on page 94;
- Repeat the previous steps on the internal stops.

7.2.2.3 - Adjusting the hydraulic tread gauge wheel assembly

After all tread gauge gaps and stop adjustments have been addressed, then the hydraulic wheel tread gauge adjustment can be done. To do so, follow the steps below:

- Drive the machine at a speed of between 5 to 8 km/h, never faster or slower, or even with the machine parked.
- Press button 36 (Figure 80) to select a front or rear wheel assembly;
- Press button 37 (Figure 80) to open or to close the wheel assembly tread gauge spacing. Press the button so that the wheel assembly travel to the end of its course;
- Repeat the procedure for the other wheel assembly.

7.3 - Main solution tank refilling

Refilling the main solution tank can be done by a portable motor-pump which is supplied with the machine. To refill using the motor-pump:

- Connect the supply hose to the motor-pump (D) (Figure 74).
- With the valve in position A (Figure 73) press the activation button C (Figure 74).
- The pump will be automatically shut-off by the maximum level sensor, or manually by the C button (Figure 74).
- After the tank has been filled, close the valve at position B (Figure 74) and remove the supply hose (D).

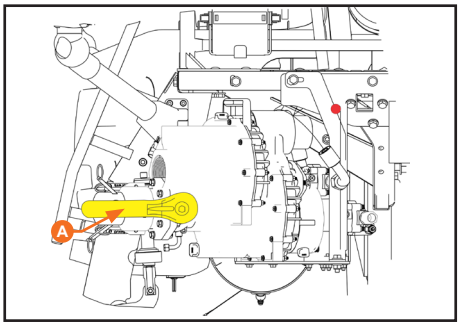


Figure 73

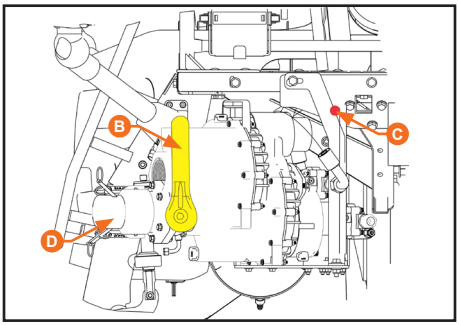


Figure 74

7.4 - Filtering equipment

Only a perfect spray solution filtering guarantees a problem-free or skip-free sprayer job:

- The pressure filter screen gauge and the nozzle filters, should always be smaller than the gauge of the nozzles used.
- Evaluate the allowable combinations of filters or screen gauges used, based on that, note manufacturer's data variations of the agricultural pesticide.

7.5 - Suction hose

Suction supply hose assembly, 5 m long.

A - Suction hose

B - Quick-connect

C - Suction filter (serves in filtering water that has been suctioned)

After the tank has been filled from an open filling area, be aware of the specific norms.

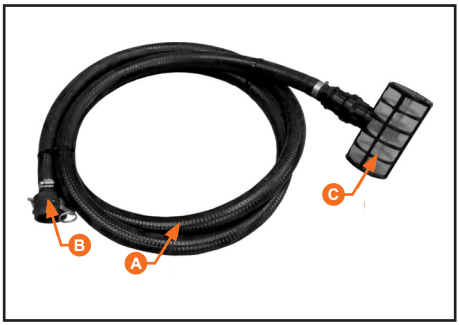


Figure 75

7.6 - Spraying

- In the technical aspect of agro-chemicals application, one of the basic conditions is that the sprayer be in perfect working condition. Therefore, regularly test the sprayer, and seek immediate resolution to any problems.
- Use all supplied filters accordingly, maintaining the sprayer on scheduled maintenances and service care.

- The spraying system operating range goes from 35 to 350 liters per minute.

7.7 - Nozzles

The nozzle housing system is of the Trijet type, which facilitates in the nozzle specific application selection. The nozzles can be disassembled and replaced, depending on the demand.

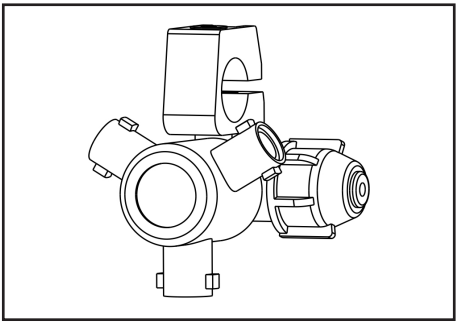


Figure 76

ATTENTION!
Before disassembling the nozzles it is required that the whole spray system be washed completely. With each change-out the nozzle pressure needs to be readjusted.

NOTE!
For nozzle application recommendations, always consult an agricultural engineer.

7.8 - Spraying system clean-out when changing defensives

When changing between defensives to be applied, it is necessary to do a complete system wash-down, to avoid the phytotoxicity of the crops.

To clean-out the spraying system, follow these steps:

1 - Drain all remaining solution in the tank.

2 - Fill the tank with approximately 1500 liters of clean water and run the spray system.

3 - Place the Topper controller in manual spray mode and raise the system pressure to maximum.

4 - With the booms open, turn-on the spraying by using the individual section switches on Topper, next, begin turning-off individual sections, one at a time with an interval of 30 seconds apart between sections.

5 - After all sections have been turned-off, reverse the process by turning-on the sections every 30 seconds apart between each section.

6 - After all the sections are open, turn-off the spray and the spray pump.

7 - Disconnect all return hoses on the spray control valve banks (C) and (D), allow the water to drain (Figure 78 and Figure 79).

8 - Remove the locking clip (A) then remove connection (B) (Figure 77).

9 - With the control valve bank return hose open, now go to the solution tank and open the tank drain valve and wait until it has been completely drained.

10 - Repeat steps 2 to 8 again should there remain any residual product in the circuit. Steps 2 to 8 should be repeated until total clean-out has been completed.

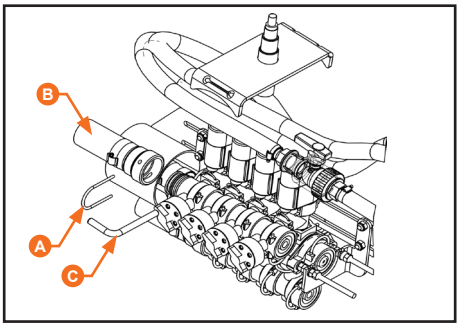


Figure 77

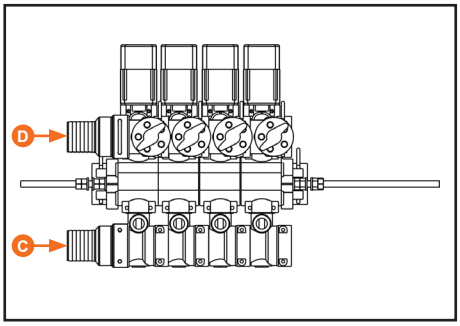


Figure 78

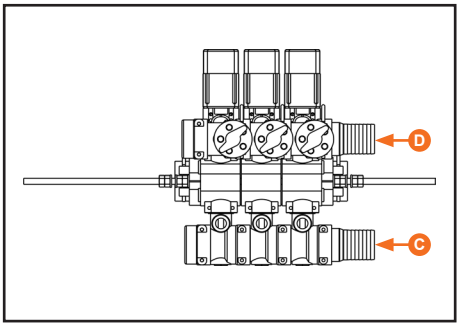


Figure 79

7.9 - Calibrated return adjustments

The calibrated return operation is to maintain the pressures between sections equal when other sections turn-on or turn-off.

The calibrated return adjustments can be done in two manners, either by pressure or discharge, both manners to follow.

7.9.1 - Pressure

To calibrate, first turn-on the sprayer in manual mode and apply a desired pressure. The pressure should be a mid range which will be used on the job. This is important so as to obtain better accuracy on the adjustments.

Turn-on the seven spray sections at the desired pressure, and as an example we will use, 4 bar.

With the pressure stabilized, turn-off the first section, keeping the other six turned-on. We will do the adjustments from left to right. Note that the pressure will vary. Using a #4 Allen wrench (point C on Figure 77), adjust the valve which corresponds to the first section, adjusting the pressure until it reaches 4 bar, tightening to increase the pressure and/or loosening to reduce it.

After calibrating the first section, turn it on, keeping all other six turned-on, now turn-off the second section, noting the pressure variation, repeat the previous steps until achieving the desired pressure, and adjusting the corresponding valve.

These steps will be repeated on all seven sections, afterwards, you will notice that when some sections are turned-off, that the pressure will remain at a constant of 4 bar, as per the example. In case the pressure is not maintained, the whole calibration process will need to be repeated.

7.9.2 - Discharge

To calibrate the calibrated return, using an output, a similar procedure will be used, but the discharge will seen on the Topper.

In order to calibrate, firstly you will need an output sample and Topper data; the samplings should be taken from one nozzle of each section, with the use of a metered measuring cup, collect a sample volume amount of solution applied for one minute. Sum the seven section samples and divide it by seven, in order to find an average. After finding the value, enter it in the *L/MIN COLLECTED option* on the Topper. After confirming the quantity of *l/min collected*, the calibration factor will be updated automatically. After the calibration factor has been updated, verify if the *current* rate is equal to the liters per minute that were collected.

Next, perform the returns calibration. Note the current application rate, turning-off one of the seven sections and verify the current rate being applied. Note this value. To calculate for the quantity of liters which should be flowing through at that moment, use the formula below:

$$\frac{\text{Total flow rate with all the sections turned-on X Quantity of nozzles turned-on}}{\text{Total booms nozzles}}$$

After the solution volume being applied with a closed section has been calculated, compare it with the current l/min rate with the section turned-off which is being shown on the Topper. If that value is different from the calculate one, using a 4 Allen wrench, adjust the control valve which corresponds to the turned-off section until the current application rate equals what was calculated.

Repeat this calibration on the other sections.

NOTE!
The section valves have 5 preset pressure settings, which can be used for other nozzle nipples types and spray pressure ranges. Selection is done by simply spinning the selector.

7.10 - Special tips for practical applications

In virtue of the automatic application volume adjustment as related to the area, the speed of the self-propelled unit and the pump rpms, thus offers a wide range of options.

Thus, the pumping capacity, again depends on the job rpms. Set the job pump rpms between 2200 to 2500 rpms, and in such a manner the flow rates for the booms spraying and hydraulic agitation is sufficient. Note that for higher spraying speeds and for higher volume consumptions, it will be required to pump a larger volume of spray solution.

Before starting the application, define the sprayer unit speed and the spraying pressure as close as possible to the values shown on the spray Table, taking into consideration the nozzle sizes and the desired application volume of liters per hectares (reference value).

When spraying, be careful not to over-shoot the spray pressure tolerance margin, which is approximately 25%.

NOTE!
If the desired spray pressure is 3.2 bar, that means that all pressures between 2.4 and 4.0 bar are acceptable.

To guarantee for optimum application and to avoid the loss of product to environmental waste, do not over-shoot the job pressure ranges, as specified for the nozzles mounted on the spray booms. As an example, on nozzles “05” the job pressure is between 1.0 to 5.0 bar.

7.11 - Control panel and Joystick functions

Control panel and Joystick lever functions listed on the figure and table below.

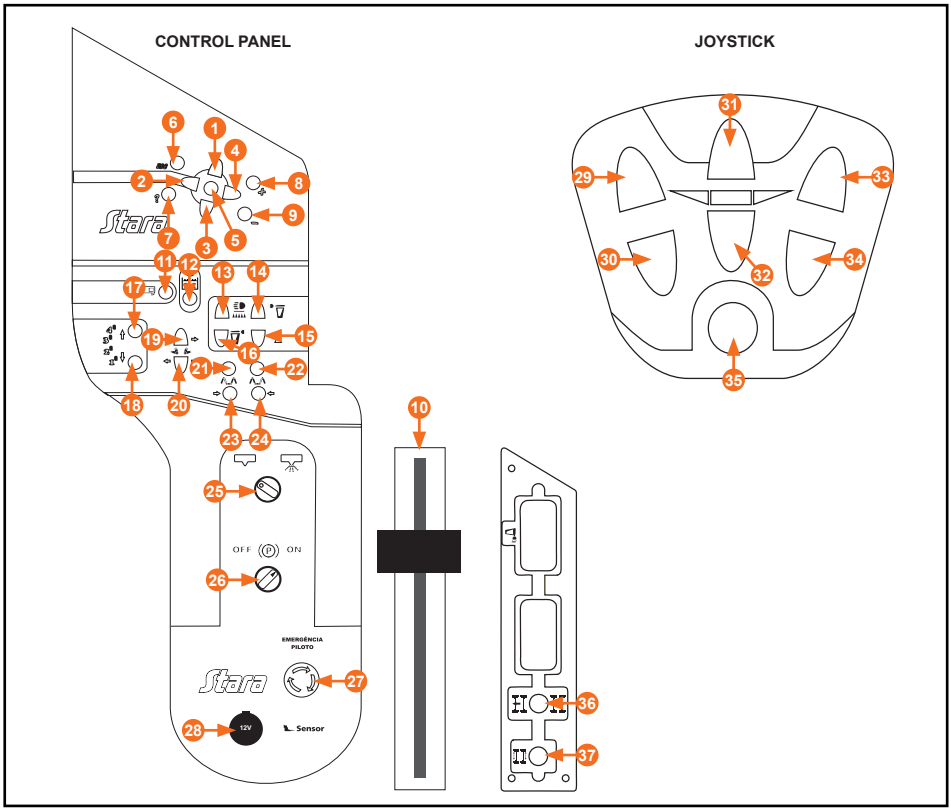


Figure 80

1	Navigator up button.	Allows user to navigate through options, guides and screen changing.
2	Navigator left button.	Allows user to navigate through options of the selected screen.
3	Navigator down button.	Allows user to navigate through options, guides and screen changing.
4	Navigator right button.	Allows user to navigate through options of the selected screen.
5	OK confirmation button.	Selects the options on menus and screens, those having more options and confirms the command issued.
6	Return button.	Returns to the previous function.
7	Help button.	Displays the correct manner in which to proceed on each operation.
8	Increase button.	Increases some requested value of the onboard computer.
9	Decrease button.	Decreases some requested value of the onboard computer.
10	Throttle control.	Pushing or pulling on the lever will increase or decrease the engine rpms. .
11	Hydraulics enabled button.	Allows for the booms hydraulic control system operation.
12	Solution agitator button.	Solution tank agitator on/off button.
13	Floodlights on/off button.	Booms lights on/off button.
14	Floodlights on/off button.	Front roof lights on/off button.
15	Warning beacon button.	Warning beacon on/off button.
16	Rear roof light button.	Rear roof lights on/off button.
17	Up-shift button.	Up shifts the gears.
18	Down-shift button.	Down shifts the gears.
19	Booms frame release button.	Unlocks the booms carriage frame.
20	Booms frame lock button.	Locks the booms carriage frame.
21	Open left boom button.	Unfolds opening the left boom.
22	Open right boom button.	Unfolds opening the right boom.
23	Close left boom button.	Folds closing the left boom.
24	Close right boom button.	Folds closing the right boom.
25	Spray pump on/off switch	Turns the spray pump on or off.
26	Parking brake on/off switch.	Turns the parking hand brake on or off.

27	Auto-pilot emergency kill button.	Enables or disables the auto-pilot.
28	12 V socket.	An optional 12 V output, or cigarette lighter.
29	Left boom raise 15° button.	Raises the left boom 15°.
30	Left boom lower 15° button.	Lowers the left boom 15°.
31	Raise carriage frame button.	Raises the booms carriage frame.
32	Lower carriage frame button.	Lowers the booms carriage frame.
33	Right boom raise 15° button.	Raises the right boom 15°.
34	Right boom lower 15° button.	Lowers the right boom 15°.
35	Auto-pilot on/off button.	Turns on or off the auto-pilot, but only if the auto-pilot function has been enabled on the Topper.
36	Front or rear tread gauge selection switch.	Selects the front or rear tread gauge adjustment.
37	Selected tread gauge open/close switch	Opens or closes the selected tread gauge.

Table 5

7.12 - Control panel and the joystick operation

The the control panel along with joystick, are responsible for monitoring the engine readings and for driving the machine and the booms.

7.12.1 - Operation and control screen

The screen displays machine information graphically. This option displays screen functions and its Navigator.

It is an information system with controls that are easy to operate and very accurate, which assists the operator when calibrating and operating the machine.

7.12.2 - Main alarm

The moment that there is a fault, or the system sends some type of critical message or event, the main alarm will be activated. An audible alarm will sound and a notification signal is highlighted in a first plane leaving previous data in a second plane of the operation screen. The alarm can only be deactivated when the operator presses the OK button (5) on the Navigator (Figure 80). In this manner the system understands that the operator is aware of the warnings.

7.12.3 - Main operation and control screen

On the job main screen (Figure 81), you can access all machine information in real-time and create job orders. It is subdivide in sections by border lines, where the information can be easily identified. To work with this screen, use the Navigator buttons on the control panel.

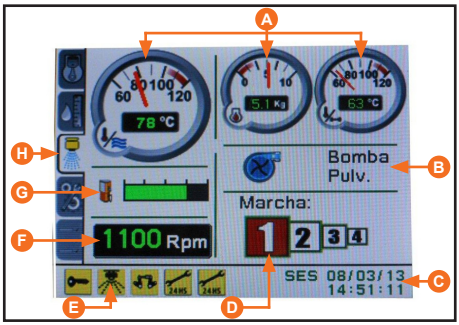


Figure 81

A - Analog meters for temperature, water, pressure, engine and hydraulic oil.

B - Spray pump indication.

C - Lower right pane, date and hour fields.

D - Gear shift indication.

E - Lower left pane, alarm indications.

F - Engine rpm indication.

G - Fuel level indication.

H - Side tab indicating current screen.

7.12.4 - Diesel engine screen

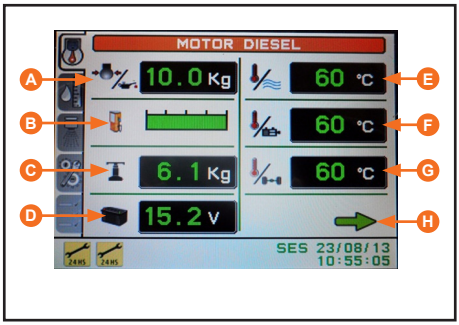


Figure 82

A - Engine oil pressure and diesel tank volume readings.

B - Fuel level reading.

C - Air pressure reading.

D - Battery current reading.

E - Engine water temperature reading.

F - Hydraulic oil temperature reading.

G - Transmission oil temperature reading.

H - Next screen indicator.

7.12.5 - Logged hours screen

A - Engine job logged hours reading.

B - Indicator disabled Topper function.

C - Indicator disabled Topper function.

To zero-out the partial hours, click on the navigator OK button, next those partial hours will begin to blink. Hold the + and OK keys for 5 seconds.

Figure 83

7.12.6 - Adjustment menu screen

This screen has four adjustment folders. To access these folders, simply navigate using the buttons on the control panel until you find the folder icon which will move around. Next, press the OK button and access the desired adjustment. Only on the *Technician* folder will it be necessary to press the + and OK buttons at the same time.

Figure 84

7.12.7 - Brightness menu screen

To adjust the screen brightness by pressing the + or – keys on the control panel. To increase the panel key brightness, press the number 4 followed by the + or – keys.

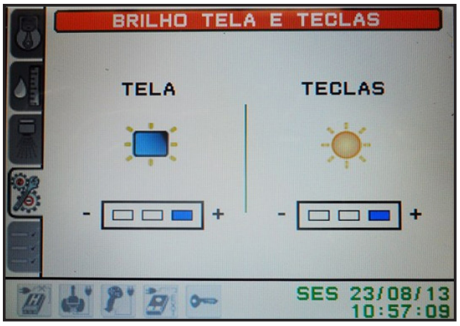


Figure 85

7.12.8 - Time adjustment menu screen

Here you can adjust the date and hour fields on the right lower pane of the screen. When the hour reading begins to blink, simply press the + or – keys on the control panel navigator, increasing or decreasing the adjustment values. The same procedure will be followed with the minutes and seconds fields. To change between hour, minute and second fields, simply press the 2 or 4 keys on the control panel navigator.

Figure 86

7.12.9 - Language selection menu screen

On this screen you can select the desired reading languages to be used. There are four languages available. To select the desire language, simply press the 2 or 4 keys on the control panel navigator. After selecting the desired language, simply press the OK button on the control panel navigator.

Figure 87

7.12.10 - Technician adjustments menu screen

On this menu screen you have the option of 3 sub-folders, noting that the *Factory* sub-folder is solely dedicated to Stara technicians. To access one of these sub-folders, simply press the OK button on the control panel navigator, and select the desired sub-folder, next press the 4 or 2 keys on the control panel navigator.

Figure 88

7.12.11 - “Memory” menu screen

On this screen you find the information transfer options between the screen to a flash-drive or from a flash-drive to the screen. Transfers consist of only machine logged hours, maintenance records and machine alarm occurrences. To access one of the options, simply press the OK key on the control panel navigator.

Figure 89

7.12.12 - Memory screen “save to flash-drive”

Copies the screen information to a flash-drive. Simply insert the flash-drive in the USB port on the right side of the screen. Next, the system will begin copying the information to the flash-drive. When the 4 bars have been filled in green, a message will appear informing that the process has been complete.

Never remove a flash-drive before this message has been displayed, or the screen files can be corrupted and may stop functioning.

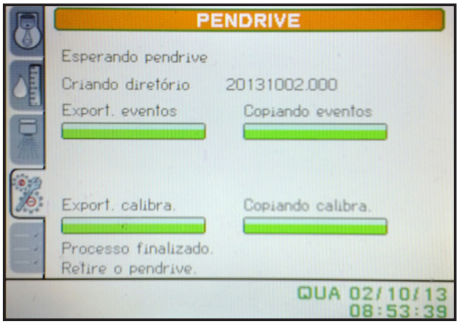


Figure 90

7.12.13 - Memory screen “read flash-drive”

To copy the flash-drive data to the screen, simply insert the flash-drive in the USB port on the right side of the screen. Next, the system will begin saving the information from the flash-drive to the screen. When the 4 bars have been filled in green, a message will appear informing that the process has been complete. Never remove a flash-drive before this message has been displayed, or the screen files can be corrupted and may stop functioning

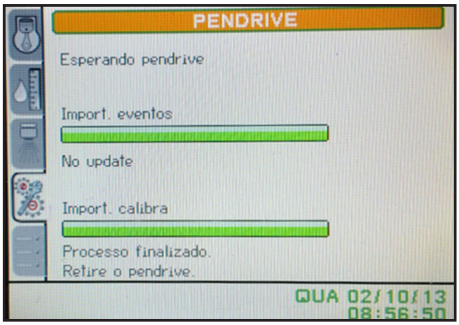


Figure 91

7.12.14 - Level sensor screen

On this screen there are options to enable os disable the solution level sensor. Simply press the + or – keys to change its state to YES or NO.

Figure 92

7.12.15 - Diagnostics menu screen

There are seven diagnostic folders referent to the machine. To access these, simply navigate using the keys 1, 2, 3 or 4 on the control panel navigator until the selected folder icon stays moving. Next, press the OK button and the desired diagnostics will be accessed.

Figure 93

7.12.16 - Diagnostics menu screen “panel screen”

Verify that the control panel is connected to the screen and the processor box. To do so, press the keys 11 to 25 on the control panel and check to see if the number zero has been changed to number 1 on the desired command. The control lever has only one option, NEUTRAL (INV). Simply move the lever from the neutral position and it will change from 0 to 1.

Example: By pressing key 13 on the control panel, and the booms lights will turn-on, and on the screen it will appear as chassis light, and the condition zero will automatically change to 1.

Figure 94

7.12.17 - Diagnostics menu screen “Joystick”

Make sure that all controls are connected with the screen and the processor box. Simply press the Joystick keys 29 to 35 and check to see if the number zero was changed to number 1 on the desired command.

Ex.: When pressing key 29 (whose function is the boom 15° on the left side), it will be changed from number zero to number 1 on the *B15 left s* option.

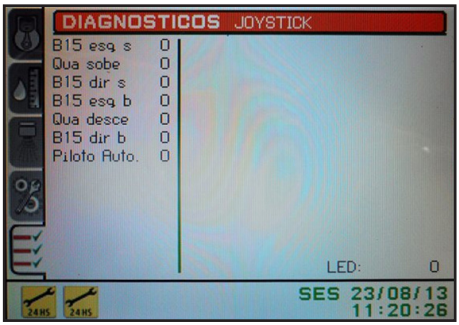


Figure 95

7.12.18 - Screen menu “diagnostics inputs”

Here we have three sub-folders to verify the sensors are connected to the processor box and the screen. Also, it show at what current levels the sensors are operating.

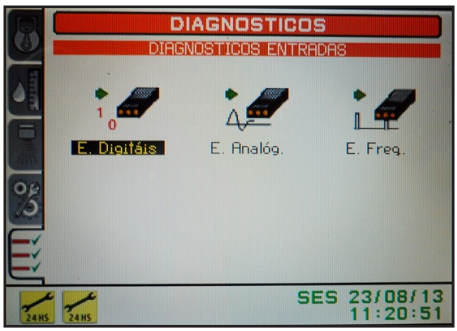


Figure 96

7.12.19 - Diagnostics menu screen “digital - hydraulic box”

This screen has the option to display if the machine sensors are connected to the processor box and the screen.

On the *Reserve Comb.,* we have the number 1 indicating that the sensor is installed and is sending data to the processor box and the screen. Next, if it maintains the number zero, the sensor has a problem, or is not connected to the processor and the screen. Next, it will suggest some warning alarms depending on the sensor.

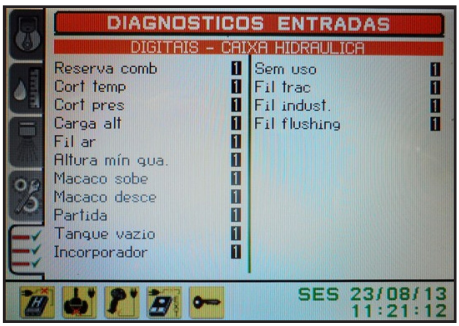


Figure 97

7.12.20 - Diagnostics menu screen “analog - hydraulic box”

This screen has the option to verify the voltage current on the sensors, also supplies a current reading of the battery at the actual moment.

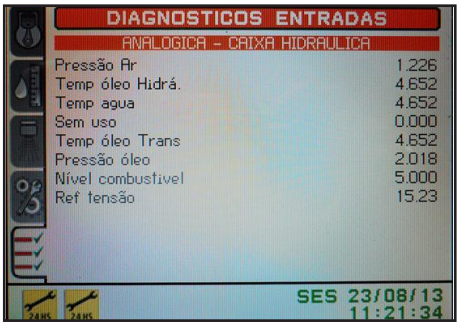


Figure 98

7.12.21 - Diagnostics menu screen “frequency - hydraulic box”

On this screen you can verify at what frequency the sensors are operating.

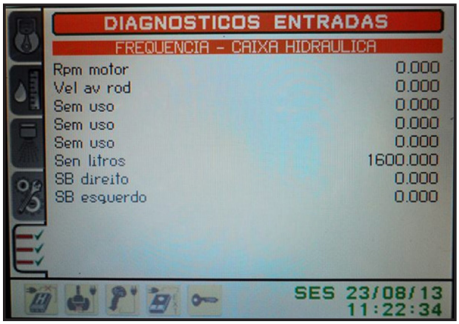


Figure 99

7.12.22 - Diagnostics menu screen “communication”

In this section we have the option to verify if there are any system communication failures.

Extra output or be it PWM, when shown on the ERR 100 column, means that there is 100% error in the communication.

DIAGNOSTICOS
COMUNICAÇÕES
DISPOSITIVO RES COM PF SOM ERR
Pain. Tela não não não não 100
Seção não não não não 100
Modulo MCP não não não não 100
Est. Met. não não não não 100
Joystick não não não não 100
Saída Hidr. não não não não 100
Entrada não não não não 100
Saída Extra não não não não 100
SES 23/08/13
11:23:14

Figure 100

7.12.23 - Diagnostics menu screen “events”

In this section, the on-board computer registers in its memory all commands executed on some optional configuration, and all alarm occurrences that were displayed, showing the hour and date at which the operator of the machine identified the problem. You can search these saved events by the date, month and year. Simply press key 4 on the control panel navigator than press the + or – keys, thus being able to navigate and check for additional events.

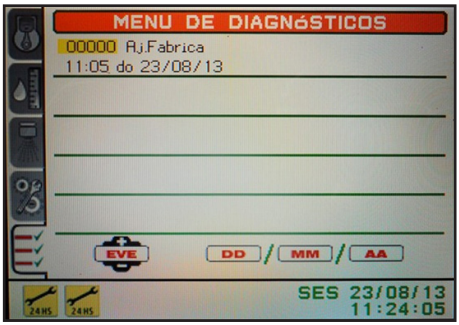


Figure 101

7.12.24 - Diagnostics menu screen “information”

Displays information as to what software e version is currently installed on the machine.

Figure 102

7.12.25 - Calibration screen “maintenance”

Here we can check and see what needs to be addressed regarding pending daily maintenances, scheduled maintenances, what needs to be replaced and inspected by qualified Stara technicians. To navigate on this screen simply press key 4 on the control panel navigator. Next an orange indicator will begin flashing. Press key 1 or 3 to change screens. There are 3 additional screens underneath for review.

NOTE!
To exit any screen, simply press the Esc key on the control panel navigator.

Figure 103

7.13 - Alarm information

1	Engine: high water temperature.	Water temperature has reached a critical 105°C. Stop the machine and check its condition and call an authorized technician.
2	Emergency: high temperature. First gear engaged.	Water temperature has reached a critical 105°C. Automatically the machine will shift into 1st. gear (safe mode). Check its condition and call an authorized technician.
3	Engine: oil pressure.	Engine oil pressure too low, and has reached a critical 1.5 kg/cm². Stop the machine and check its condition and call an authorized technician.
4	Hydraulics: output rate pressure at a maximum.	The spray system is out of calibration. Stop the machine and check its condition and call an authorized technician.
5	Spray module: short circuit has been detected.	The main panel has a short-circuit. Stop the machine and turn off the main switch, so that there will not be any additional problems, check its condition and call an authorized technician.
6	Transmission: high oil temperature.	The transmission hydraulic oil has reached 90°C. Stop the machine and check its condition and call an authorized technician.
7	Hydraulics: high oil temperature.	The hydraulic oil temperature is high, at a critical 90°C. Stop the machine and check its condition and call an authorized technician.
8	Compressor: low air pressure.	The air pressure sensor has detected that the pressure is below 4.5 kg/cm². Stop the machine and check its condition and call an authorized technician.
9	Compressor: high air pressure.	The air pressure sensor has detected that the pressure is above 9 kg/cm². Stop the machine and check its condition and call an authorized technician.
10	Engine: alternator is not charging.	The alternator is not working properly or the electrical system has a problem. Stop the machine and check its condition and call an authorized technician.
11	Spraying: flow rate loss at the flowmeter.	The flowmeter sensor detected loss of product flow rate at that moment. Stop the machine and check its condition and call an authorized technician.
12	Spraying: minimum pressure out of calibration.	Central detected that the spray system pressure is out of calibration. Stop the machine and check its condition and call an authorized technician.
13	Spraying: high pressure out of calibration.	The sensor detected that the jet stream pressure is too high. Stop the machine and check its condition and call an authorized technician.
14	Spraying: low pressure out of calibration.	The sensor detected that the jet stream pressure is too weak. Stop the machine and check its condition and call an authorized technician

15	Spray pump: caution, pump out of water.	The pump is not pushing water or something is obstructing its flow. Stop the machine and check its condition and call an authorized technician.
16	Tank: totally empty.	The tank sensor has detected that there is no water. Stop the machine and check its condition and call an authorized technician.
17	Tank: totally full.	The tank sensor has detected that the tank is full of water. Be careful so that it will not overflow. Check its condition.
18	Tank: water level too low.	The sensor has detected that the tank water level is to low for the application. Stop the machine and check its condition and call an authorized technician.
19	Tank: water level completed.	The sensor has detected that the tank is ready for the application. Turn-off the pump and check its condition.
20	Tank: level sensor failure.	The sensor has an operational problems. Stop the machine and check its condition and call an authorized technician
21	Tank: calibration error.	The sensor cannot identify its system calibration. Stop the machine and check its condition and call an authorized technician.
22	Transmission: drain tank for 4th. gear.	The sensor has detected excess weight to drive in 4th. gear. Go into safe mode.
23	Danger: do not spray in 4th gear.	The machine does not operate in 4th. gear when spraying. Goes into safe mode operation automatically and continues working in 3rd. gear.
24	Engine: water temperature sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
25	Engine: oil pressure sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
26	Hydraulics: Oil temperature sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
27	Compressor: air pressure sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
28	Engine: low battery charge or blown fuse.	The battery charge load capacity is being drained or there is a blown fuse. Stop the machine and check its condition and call an authorized technician.
29	Engine: air filter is saturated.	The air filter needs to be replaced or basic maintenance servicing is required. Stop the machine and check its condition and call an authorized technician.
30	Transmission: self-cleaning filter saturated.	The filter detected an oil clot and it must be replaced. Stop the machine and check its condition and call an authorized technician.
31	Hydraulics: industrial filter is saturated.	The filter detected an oil clot and it must be replaced. Stop the machine and check its condition and call an authorized technician.

32	Transmission: dual suction filter is saturated.	The filter detected an oil clot and it must be replaced. Stop the machine and check its condition and call an authorized technician.
33	Engine: low fuel level.	The sensor is indicating that the fuel tank has switched to reserve diesel tank.
34	Engine: fuel sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
35	Engine: air filter sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
36	Transmission: self-cleaning filter sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
37	Hydraulics: industrial filter sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
38	Transmission: Dual suction filter sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
39	Transmission: hydro cooler sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
40	Transmission: hydro cooler working.	The hydro cooling fan is working.
41	Boom leveling: right sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
42	Boom leveling: left sensor failure.	The sensor is damaged or has stopped working. Stop the machine and check its condition and call an authorized technician.
43	System: hydraulics box is turned-off.	The black box is not communicating with the Sensor panel or screen. Stop the machine and check its condition and call an authorized technician.
44	System: spray module is turned-off.	The black box is not communicating with the hydraulics system or screen. Stop the machine and check its condition and call an authorized technician.
45	System: control panel is turned-off.	The control panel is not communicating with the black box or screen. Stop the machine and check its condition and call an authorized technician.
46	System: Joystick is turned-off.	The Joystick is not communicating with the black box or screen. Stop the machine and check its condition and call an authorized technician.
47	System: PWM external output is turned-off.	The PWM system becomes inactive if it does not communicate with the black box or screen. Stop the machine and check its condition and call an authorized technician.

48	Engine turned-on.	The engine is already turned-on, not needing to use the starter again, there may be a problem with the injector pump solenoid. Contact an authorized technician.
49	Spray pump turned-on.	The sensor detected that the spray pump is turned-on.
50	Transmission: hand-brake selected.	The sensor detected that the hand-brake has been applied. Release the brake so that the machine can be driven.
51	Transmission: possible brake system failure.	The sensor detected a possible system failure. Stop the machine and check its condition and call an authorized technician.
52	Spray: track incomplete.	The sensor detected a failure in the nozzle water flow. Stop the machine and check its condition and call an authorized technician.
53	Boom: carriage frame locked.	The sensor detected that the carriage frame was locked, use it only when the booms are closed and when opening them.
54	Boom: carriage frame released.	The sensor detected that the carriage frame was released, use it only in job mode when starting to spray.
55	Transmission out of neutral.	The sensor detected that the control lever is out of the neutral position. Stop the machine and check its condition and call an authorized technician.
56	Controls: inclination is out range.	The inclination control sensor is out of calibration. Stop the machine and check its condition and call an authorized technician.
57	Transmission: low oil pressure.	The sensor has detected that the transmission oil pressure is too low, which could cease the engine. Stop the machine and check its condition and call an authorized technician.
58	Attention: engine maintenance at 24 hours.	Alerts the operator that the following daily maintenances have been done, like: engine water level, engine oil level and diesel filter drainage. These simple procedures guarantee the increased life expectancy of the engine.
59	Attention: engine maintenance at 250 hours.	Alerts the operator of the need for an engine check-up. Request for technical assistance, those who will change the engine oil and filter, and the fuel filter.
60	Attention: engine maintenance at 500 hours.	Alerts the operator of the need for an engine check-up. Request for technical assistance, those who will change the air filter, fluids and the radiator water.
61	Attention: engine maintenance at 1000 hours.	Alerts the operator of the need for an engine check-up. Request for technical assistance, those who will change the belts, adjust valves, clean-out the injector nozzles, check the vibration shock-absorber, and drain the fuel tank.
62	Attention: components maintenance at 24 hours.	Alerts the operator of the need for the following daily maintenances, like: general machine hardware tightening, check oil levels on the transmission and industrial tank, flowmeter and spray filter cleaning. These simple procedures guarantee component durability thus avoid down-time during the job.

63	Attention: components maintenance at 100 hours.	Alerts the operator of the need to clean the battery posts. This procedure avoid the poor performance of the electronics on the machine. Suggested use of the product WD-40. Consult an authorized technician.
64	Attention: components maintenance at 500 hours.	Alerts the operator for the need of components check-up. Request for technical assistance to replace the Industrial filters, self-filtering and dual suction oil filters.
65	Attention: components maintenance at 1000 hours.	Alerts the operator for the need of components check-up. Request for technical assistance to change-out the hydraulic oil ST OIL ISO 68 and replace air conditioning sanitizing filters.
66	Attention: engine oil change at 50 hours.	Alerts the operator for the need of an engine check-up. Request for technical assistance to change-out the engine oil.
67	Attention: engine air filter change at 50 hours.	Alerts the operator for the need of an engine check-up. Request for technical assistance to change-out the engine air filter.

Table 6

7.14 - Opening and closing the booms

7.14.1 - Opening the booms

To open the booms, follow these steps below, and observe the control panel graphics, Figure 80.

- Press key 20 to lock the carriage frame.
- Remove the booms from their resting position by pressing key 31 on the joystick.
- Press keys 21 and 22 together until their full travel has been completed, until the booms have fully opened. Afterwards, maintain the keys pressed for another 5 seconds, in order to confirm that its totally opened.
- Press key 32 on the joystick to lower the booms.
- Adjust the booms job height by pressing keys 29 and 30 (raise/lower left side 15°), and keys 33 and 34 (raise/lower right side 15°).
- Release the carriage frame to start the spraying procedure by pressing key 19.

Now, the booms are ready, their are open and in their working position.

7.14.2 - Closing the booms

To close the booms, follow these steps below, and observe the control panel graphics, Figure 80.

- Press key 11 to release the hydraulic system.

- Press key 31 on the joystick in order to raise the carriage frame to its full course of travel.
- Press key 20 to lock the carriage frame.
- In order to close the booms, press keys 23 and 24 together, until the booms have traveled their full course. After they have closed, maintain the keys pressed for an additional 5 seconds in order to verify that they have closed completely.
- Press key 32 on the joystick to lower the booms to their resting position, next after they have come to their rests, maintain it pressed for another 5 seconds, in order to confirm that they are fully on their rests.

Now, the booms are closed and in their transport position.

CAUTION!
In order to open or close the booms, the carriage frame must be locked.
Working the machine with the carriage frame locked could damage the booms system, besides the disproportional application distribution, due to the irregular movements of the booms. Always release the carriage frame before starting the job.

7.15 - Maneuvering the machine

To maneuver the machine, power-up and throttle-up (key 10 on Figure 80) to the desired point, move the gear shift lever from the *neutral position* to the forward position if traveling “forward” or pull back for “reversing”. To reduce speed or when braking, and in a gradual motion, move the shift lever toward the *neutral* position.

CAUTION!
The machine can only be maneuvered after the parking brake has been released. In order to assist with the proper operation and to avoid damages the brakes, the on-board computer will emit audible and display screen alarms.

The self-propelled has the option of 3 job related gears:

1 - Gear = 0 to 18 km/h = job speed.

2 - Gear = 0 to 25 km/h = job speed.

3 - Gear = 0 to 35 km/h = job speed.

4 - Gear = 0 to 45 km/h = used for roadway travel, with an empty solution tank.

WARNING!
In case of the need for sudden braking, move the shift lever to the *neutral* position, reducing the gears, and apply the parking brakes.

7.16 - Valve positions

7.16.1 - Suction valve position selections

A - Main solution tank suction (Figure 104).

B - Clean water tank suction (Figure 105).

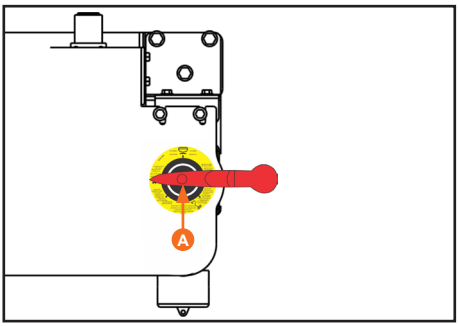


Figure 104

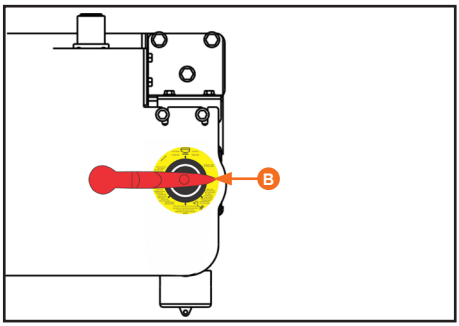


Figure 105

C - Main solution tank drainage (Figure 106).

D - Line cleaning, valve closed (Figure 107).

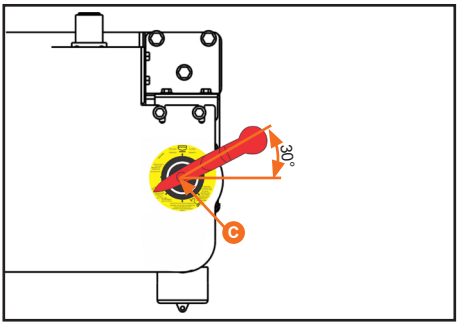


Figure 106

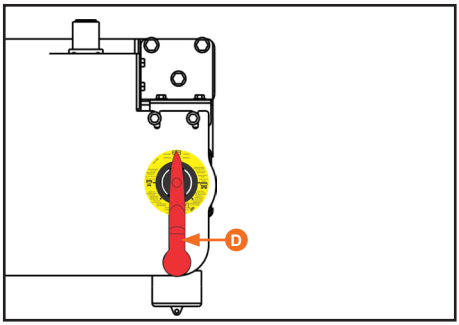


Figure 107

7.16.2 - Solution flow directional valve

- Sprayer control pressure (Figure 108). Button (A) turned-off.
- Container washer control pressure (Figure 108). Button (A) turned-on.

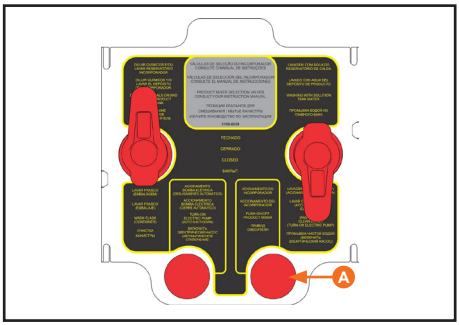


Figure 108

7.16.3 - Solution agitation valve

A - Agitator flow adjustment valve (Figure 109).

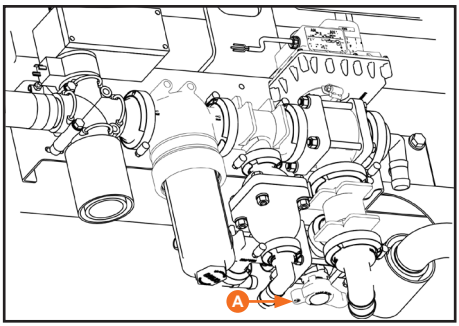


Figure 109

7.17 - Using the product mixer

A - In order to dilute/dissolve the defensive to be used, it is recommended using the water in the solution tank. Thus, turn the flow selection valve to position B (Figure 111).

B - Turn the valve which allows water to enter into the product mixer to position D (Figure 113) and next add the defensive to the product mixer.

NOTE!
The defensive needs to be added to the product mixer according to the requirements and/or as applicable to each type of product.

C - To mix defensive into the solution tank, turn the product mixer suction valve to position E (Figure 114).Turn the mixer panel valves to position F (Figure 115), thus halting water entry into the product mixer.

D - After mixing the pesticide, triple wash the empty pesticide containers. Now it is recommended to use the water in the clean water tank. Before washing the containers, check to see if there is water in the tank and turn-on button A (Figure 110).

E - Product mixer procedures: turn the flow selection valve to position C (Figure 112), thus selecting

clean water flow. Next, with the empty container already in the wash position, turn-on the electric pump indicated by the letter H on Figure 117), thus releasing clean water flow to the washer with the valve in position G (Figure 116). In the time intervals between changing empty containers to be washed, close the product mixer water flow release valve.

F - Next, internally wash the product mixer, turn the valves to position I (Figure 118). The wash-down will be completed when there is no longer any pesticide residue on the walls or bottom of the product mixer.

G - To end the product mixer procedure, turn the product mixer suction release valve to position F (Figure 115). Wait until there no longer is any pesticide fluids or residue in the product mixer and turn the product mixer suction release valve to position J (Figure 119). At this point, the product mixer will stop suctioning.

NOTE!
Verify to see if the product mixer wash-down was successful. If necessary, re-do the whole procedure again.

H - Turn-off button A (Figure 110), thus allowing for the start of the spraying process.

CAUTION!
Adhere to all safety measures presented in this manual.

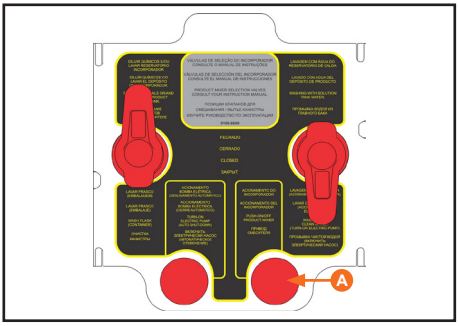


Figure 110

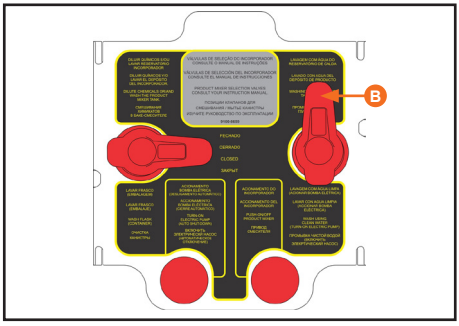


Figure 111

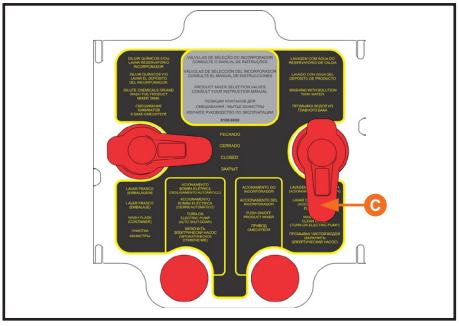


Figure 112

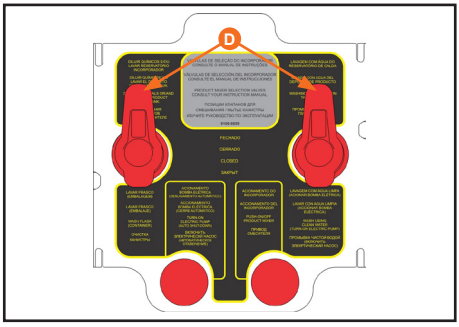


Figure 113

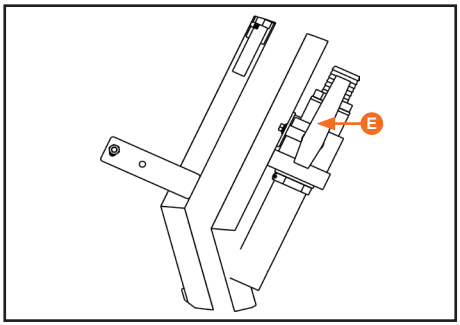


Figure 114

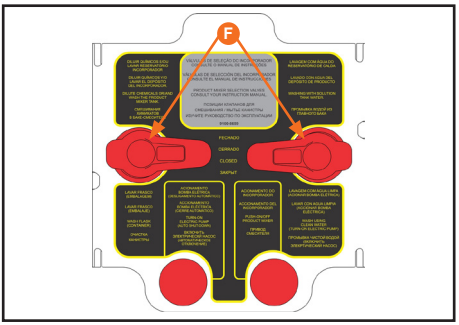


Figure 115

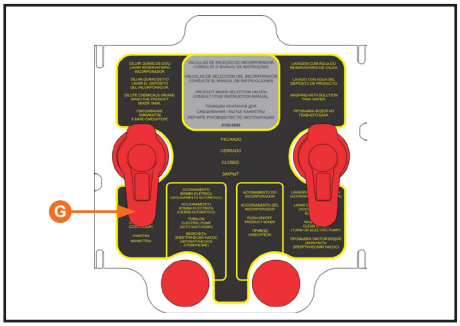


Figure 116

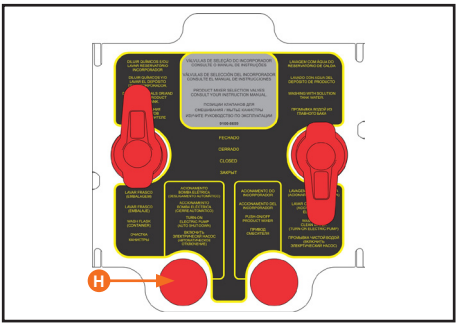


Figure 117

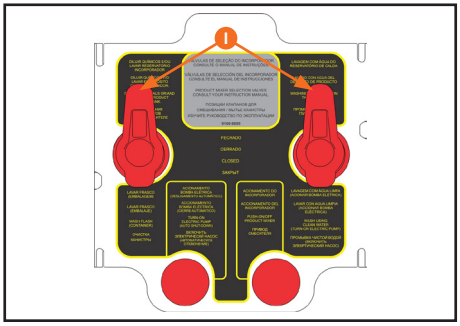


Figure 118

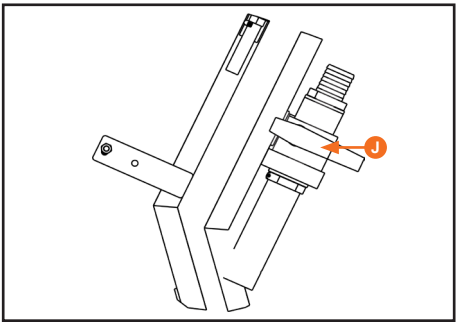


Figure 119

7.18 - Workstation

7.18.1 - Steering column

- Ignition switch (A): located on the right side of the column, is responsible for starting the engine. Before starting, always sound the horn (B) wait 5 second, to disperse those around the machine.
- Tilting the column base (C): to adjust the tilting, press the adjustment button and then push or pull the column to the desired position.
- Telescoping steering wheel: pull the lever (D) and pull or push the steering wheel to the desired position, then release the lever (D) thus locking-in the desired position.
- Hazard light (E): to turn-on the hazard light, press the lower part of the button.
- Driving lights (F): to turn-on the driving lights, press the lower part of the button.
- Function lever (G): with this lever you can turn-on the horn, the wind-shield washer with 3 speeds, the left and right turn signals, and also the wind-shield washer spray.

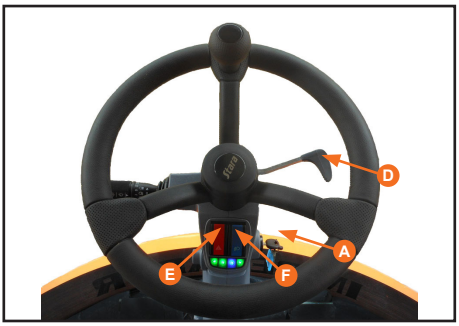


Figure 120

Figure 121

7.18.2 - Seat

- Seat distance adjustment is done using the lever (H): this adjustment moves you closer or further away from the steering column, according to the needs of the operator (Figure 123).
- Height adjustment (I): adjusts the seat height according to the operator's need. Moving the lever up, will cause the seat to be raised, and moving the lever down will lower the seat (Figure 123).
- Seat cushioning adjustment lever (J) (Figure 123): has three firmness adjustment positions. The rear setting is for a firm cushioning, the center position for a medium cushioning and the front setting for a soft cushioning.
- Safety seat-belt (L): the seat-belt is a retractable type, and should always be used when operating the machine, so as to guarantee the safety of the operator (Figure 125).
- Armrest adjustment (M) (Figure 122): is used to adjust the armrest tilting and support as need and as desired to the operator's liking. Turning it to the left and the armrest lowers, while turning it to

the right and it will be raised.

- Seat back-rest tilt angle (K) (Figure 124): is used to adjust the back-rest tilt angle of the seat.

Figure 122

Figure 123

Figure 124

Figure 125

7.18.3 - Radio

The Imperador 3100 is equipped with a standard radio. Having the following characteristics, *AM/FM, CD PLAYER, MP3, USB* and an *AUX.* input.

Figure 126

7.18.4 - Air-conditioner

- The air-conditioner has two functions, as a fan and as an air conditioner.
- On the left side of the display there are three buttons, the center (N) is pressed when desiring to turn on the air conditioner (AC).
- The other two buttons, a lower one (O) and an upper one (P) which set the desired temperature. The lower one (O) lower the temperature, and the upper one (P) raises the inner temperature.

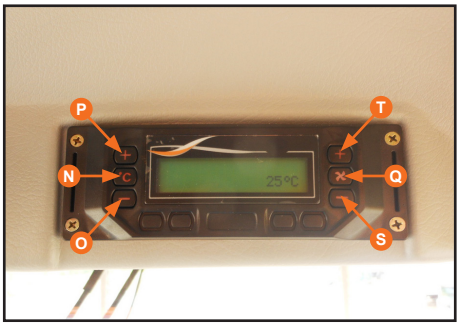


Figure 127

- On the right side, there are three buttons, the middle button (Q) turns-on the fan, and the other buttons, the lower one (S) and upper one (T) raise or lower the fan speed in the cabin.

NOTE!
When using the AC and fan functions, you must chose one, since they do not operate simultaneously, only the one selected will operate.

7.18.5 - AC warm function

In order to use the warm air system on the Imperador 3100, you must open the engine water flow valve, to do so turn the engine valve to the open position (Figure 128).

Next, if the fan is selected (Q) on the air controller, set the fan speed to your needs.

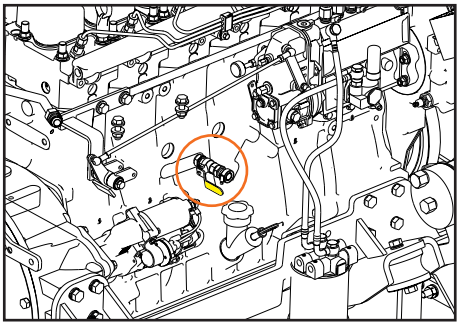


Figure 128

NOTE!
If the AC cooling function is selected, you must close the engine water valve on Figure 128, otherwise there will be a loss in the air cooling efficiency.

7.18.6 - Internal auxiliary light

The internal auxiliary lamp, has three positions which assists the operator with his needs.

- Left position: maintains the light turned-off.
- Center position: the light will turn on the moment that the door is opened.
- Right position: maintains the light turned-on.

7.18.7 - Inverter 110 V

The Imperador 3100 has an inverter which converts its voltage to 110 volts, depending on the operator's needs, like charging a cell phone or notebook.

CAUTION!
Maximum power of 200 W.

Figure 129

7.18.8 - Air valve

The Imperador 3100 has a compressed air valve, which can be used to maintain the working area clean. It is recommended that at the end of each work day, that an internal cabin cleaning be done.

Figure 130

7.18.9 - Control panel and joystick

The control panel and joystick functions are detailed on section 7.11 on page 53 of this manual.

Figure 131

7.18.10 - Instructor seat

To adjust the instructor seat (A), it is recommended to pull the seat by its strap (B) until it is in its horizontal working position (Figure 132).

NOTE!
When you hear a “click”, then the seat is ready for use.

To fold-down the seat (C), it is recommended to pull the seat upwards. Next, push it towards the back support (D) and then lower it until it latches in position again (Figure 133).

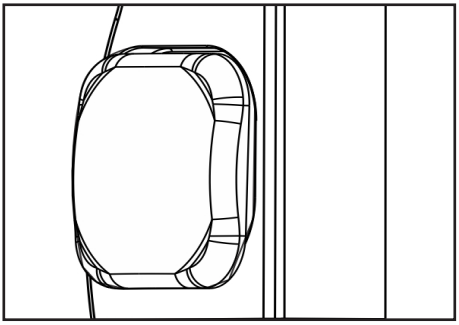


Figure 132

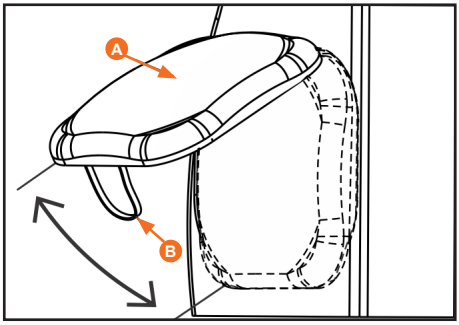


Figure 133

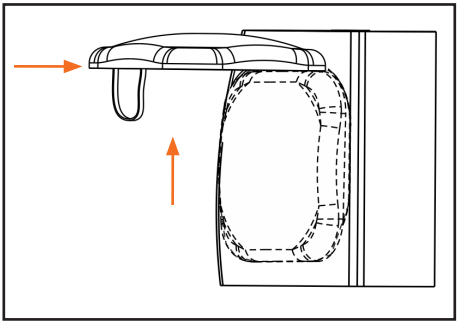


Figure 134

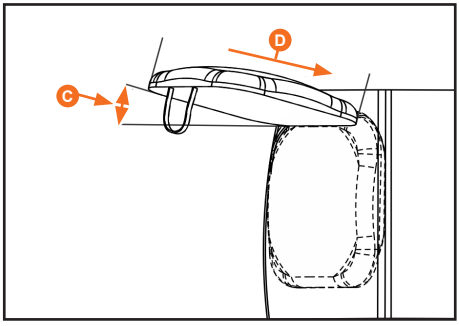


Figure 135

7.19 - Releasing the brakes

For safety reasons, the wheel brakes are only released with air pressure. But, should there be a problem with the machine and it needs to be towed, the brakes will be release.

To release the brakes, remove the reduction gear plug (A), removing the shaft (B) (according to Figure 136(Figure 136) whose function is to join the reduction motor assembly. This procedure is to be done on all four wheel assemblies

CAUTION!
In order to tow the machine, you will need a towbar on the front side or rear side, since the machine will be without any brakes. For safety reasons, never proceed with this procedure without an authorized Stara technician present.

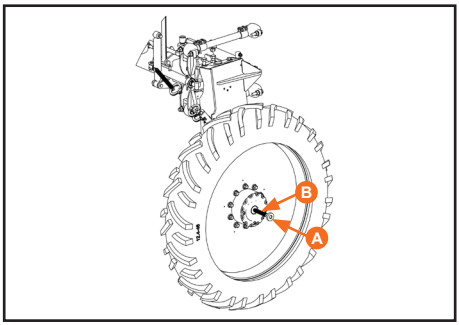


Figure 136

7.20 - Wheel alignment

7.21 - Front wheel alignment

To guarantee a uniform ware of the front tires, it is necessary to maintain them in proper alignment.

To verify the front tire alignments, you will need to take a measurement between the front side of the tires and on the backside of the rim. This measurement should be done following these steps:

1st. - Check to see that the cylinders have been compensated, turning the wheel assembly to the left and keeping it in this position for 5 seconds. Now turn it to the right side and then return to the center. Repeat this procedure three times.

2nd. - Align the wheel so that the tires remain parallel with the chassis, traveling 10 m in a straight line.

3rd. - Measure the front side and the rear side of the rim. This should be done on the middle of the rim.

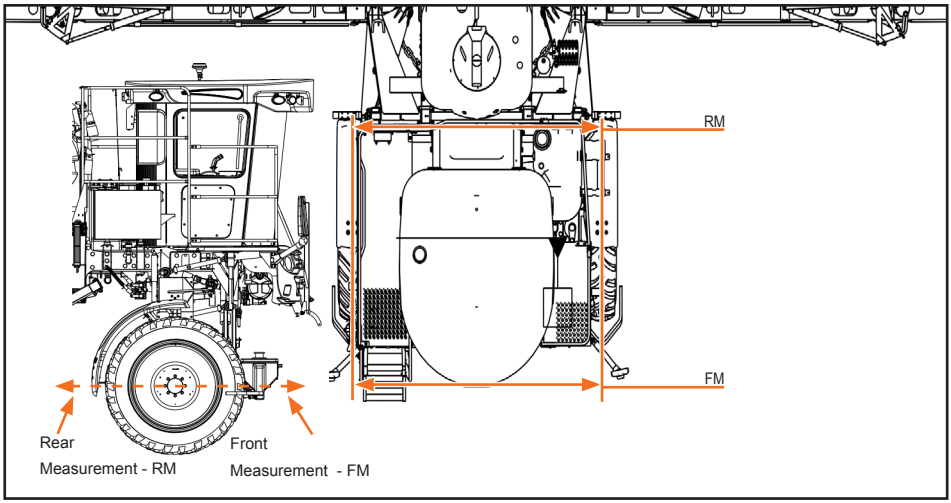


Figure 137

4th. - The front measurement needs to be 10 mm (1 cm larger then the rear measurement). Should this not be, you will need to adjust the steering cylinder shafts until you obtain the correct measurement (Figure 138).

5th.- To adjust, simply loosen the nuts (A) and (B) bushing lock adjustment.

6th.- Turn the shaft or pivot, depending on how much thread remains at each point. Maintain a minimum of 20 mm of threads on both sides (Figure 138).

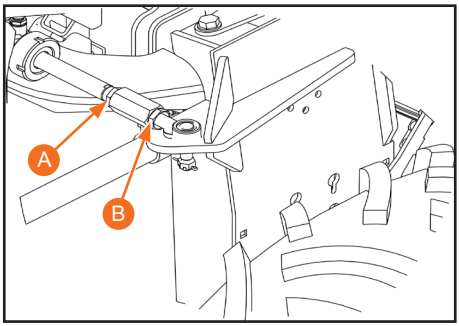


Figure 138

7th. - Repeat the two previous steps on the other side (Figure 138).

8th. - Move both uniformly. Next, retighten both nuts (A) and (B) (Figure 138).

7.21.1 - Centering the wheel assemblies

So that the wheels are properly aligned, and thus avoiding premature ware and tear of the machine components and, the crushing of the crop, the following steps should be done:

Define a fixed point on the center of the chassis, for example A, from where you can measure the machine's legs in the same manner, example B. Verify the measurements between points AB and AC (the measurements should be equal). In case one of the measurements is different, adjust the central rod (D) according to Figure 139 and Figure 140.

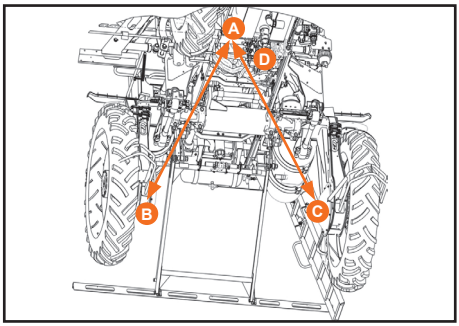


Figure 139

To verify that the wheel assembly is aligned, measure the wheel assemblies as an X, measuring from point A to B and C to D as per Figure 140. Both measurements should be equal. If not, adjust the rods E and F (Figure 141).

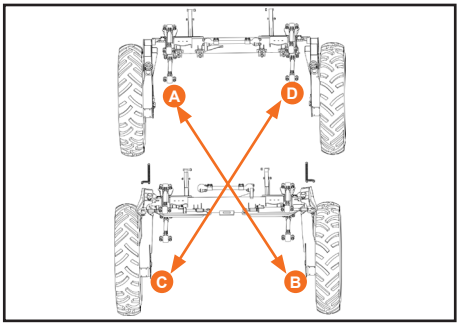


Figure 140

NOTE!
This procedure should be done on the front and rear wheel assemblies. Verify that the tire tread gauge is equal on the front and rear wheel assemblies, as also the symetricy.

7.21.2 - Vertical alignment

It is recommended to verify and to adjust the wheel assembly vertically, if necessary. To do so, it will be necessary the use of a level (A), place it on the rear wheel axle, and verify its alignment. In case it is not leveled, adjust by lengthening or shortening the length of the rods E and F as per Figure 141.

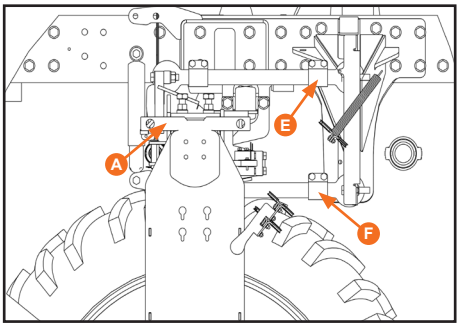


Figure 141

NOTE!
So that measurements and adjustments are correct, check that the air bag shocks are with a height of 290 mm.

ATTENTION!
Repeat this procedure whenever there is a change to some part on the machine, like legs, adjustment rods and rod bushings.

7.22 - Solution tank level sensor

For the safety of the spray pump, the Imperador has a minimum level sensor, which reads the presence of solution in the tank or not, halting the pump operation while its dry, and that it damage the mechanical seals.

To calibrate the sensor, when necessary, the tank will need to be empty, hold the button on the right side of the sensor for 7 seconds.

When there is solution in the tank, the sensor will not light its LED, and when there is no solution present, the LED will light-up.

7.23 - Self-propelled tire calibration

To install a tire onto a rim, the following procedure below should be followed:

1 - Fill the tire so that the bead will seat properly, as per the manufacturer's specified mounting pressure.

2 - If one of the beads is not properly seated with the specified mounting pressure, there may be some irregularity which may be hindering the proper mounting. If this should occur, remove the valve stem and deflate the tire completely. Loosen both beads from the rim and lube the beads and rim flanges again. Re-install the valve stem and repeat the filling procedure.

3 - After the beads have been seated, fill the tire until it reaches the recommended working pressures on Table 7, on the following page.

Working pressure (psi or lbs/inch²)		Installation pressure (psi or lbs/inch²)	
Tire 13.6x38 14 PLY		**Tire 13.6x38 14 PLY**	
Pirelli	49	Pirelli	36
Goodyear	50	Goodyear	35
Tire 18.4x26 12 PLY		**Tire 18.4x26 12 PLY**	
Pirelli	32	Pirelli	36
Goodyear	32	Goodyear	35
Tire 12.4x36 12 PLY		**Tire 18.4x26 12 PLY**	
Pirelli	48	Pirelli	36
Goodyear	48	Goodyear	35
Tire 320/90R46 or 300/95R46		**Tire 320/90R46 or 300/95R46**	
Pirelli	72	Pirelli	35
Goodyear	N/A	Goodyear	N/A
BKT	58	BKT	36
Trelleborg	58	Trelleborg	51

Table 7

8 - SCHEDULED MAINTENANCE

8.1 - Scheduled maintenance for the MWM diesel engine

MWM DIESEL ENGINE							
	Daily	**50 h**	**100 h**	**250 h**	**500 h**	**750 h**	**1000 h**
Crankcase oil level	X						
Radiator water level	X						
Drain diesel filter	X						
Engine oil change				X			
Engine oil filter (7911-4309-FO - 1 piece)				X			
Fuel filter (7911-4309 - 1 piece) **Fuel filter (90541.15.1.0020-R60.10Mic) (R60-10M-Parker)**				**X**			
Air filter/Primary air filter (7911-4360 - 1 piece) **Secondary air filter (7911-4361- 1 piece)**					X		
Radiator fluids					X		
Belt replacements							X
Valve adjustments							X
Injector nozzles clean-up							X
Check engine dampener mounts							X
Drain and clean-out fuel tank							X
Contact nearest MWM authorized representative for preventative maintenance (Check MWM manual for authorized representatives)							X

Table 8

8.2 - Scheduled maintenance for components

COMPONENTS						
	Daily	100 h	250 h	500 h	1000 h	2000 h
Re-tighten cabin bolts	X					
Re-tighten wheels	X					
Check transmission oil level	X					
Check industrial oil level	X					
Flowmeter clean-up	X					
Spraying filter clean-up	X					
General machine re-tightening	X					
Replace flowmeter (7920-4172- RC - 1 piece)				X		
Change gear box oil (Spartam Oil E ISO VG 220; part no. 9400-0322, ANP 0291 - 1st change at 50 hours)			X			
Change industrial system oil (ST OIL iso 68)						X
Replace internal Industrial tank filter element (1527-4101 -1 piece) (Petronas - Tutela Hidrobak 68 (original) part no. 9400-0322; Petrobras Marbrax HV 68; Texaco Rando hdz 68 - 80 liters)						X
Change transmission hydraulic oil, in S.S. tank (ST OIL iso 68)					X	
Replace self-cleaning filter element (7911-4236 -1 piece), installed internally of the “S.S. tank”, (Figure 142) (Filter element, 5 microns, Pt4 936747) (REF. 93674) part no. (7911-4236)					X	
Replace suction filter elements (7911-4509 -2 pieces) found on the right side (Figure 144) (Filter, SPIN ON, Donaldson P62208, part no. 7911-4509-EL)				X		
Replace Air Conditioning filter (7901-4130-FIL -1 piece)					X	
Clean battery posts		X				
Replace hydraulic tank air filter (7911-4235 - 2 pieces) and suction filter elements (7911-4239 - 2 pieces and 7911-4238 -1 piece)						X
Solution tank tie-downs		X				
Tread track gauge gap adjustment		X				
Check on the front wheels convergence				X		

Table 9

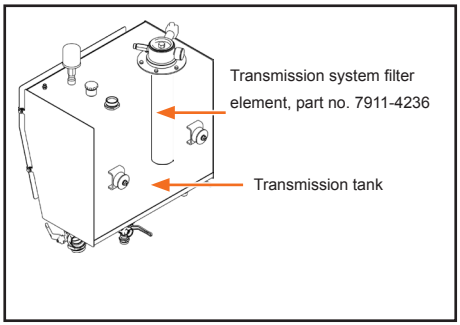


Figure 142

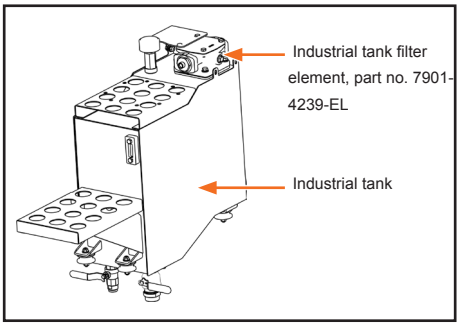


Figure 143

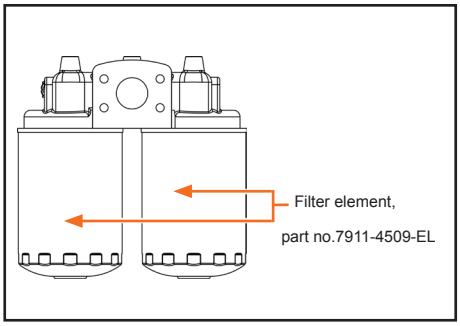


Figure 144

8.3 - Industrial system oil filter and oil change

It is important to change out the suction filters annually, remove the suction filter housings which hold the filter elements.

The replacement hydraulic system oil to be used is ST OIL ISO 68. This being done under normal working conditions, and should be changed annually, or every 2000 hours. In case of extreme conditions, life expectancy will be less, thus an evaluation of its condition should be done.

NOTE!
Never mix oil brands.

8.4 - Transmission system filter and oil change

The oil should be changed every 1000 hours, to do so follow these steps:

- Replace all transmission oil system filtration elements;
- Drain the transmission oil tank;
- Refill the transmission oil tank with hydraulic oil type ST OIL ISO 68, up to fill-line;
- Power-up the machine and keep it running in the neutral position at 1500 rpm for a period of 4 hours, so that a complete oil filtration processes has been done.

NOTE!
Never use different brands of oil than specified in the manual. When the "Saturated Filter " alarm sounds, and or when the temperature is above 40ºC, replace filters, even though the working hours have not reached the scheduled maintenance.

8.5 - System clean-up procedure and oil filtration

1 - Drain the transmission oil tank and clean-out the tank.

2 - Drain all transmission hoses and clean them.

3 - Replace all transmission filters.

4 - Top-off all oil levels as specified in the manual.

5 - With the Imperador turned off, bleed the pump hose, eliminating any air pockets in the hose, afterwards re-tighten the hose (Figure 145).

6 - Power-up the machine and keep it running in the neutral position at 1500 rpm for a period of 4 hours, so that a complete oil filtration processes has been done.

7 - Block 3 wheels of the machine, jack-up the fourth wheel using a hydraulic jack, making sure that the machine is securely blocked in. On the suspended wheel, loosen the hose end-nut on Figure 146, draining any air trapped in the system. Next, start the machine and with the MWM engine running at 1350 rpms, engage the control lever with the wheel suspended and leave the Imperador operating for 2 minutes, so that the oil will circulate and bleed any air in the system. Repeat this procedure on the other 3 wheels.

8 - After completing the above procedures, replace the traction tank filter, part number 7911-4236, which is mounted on top of the traction tank, and the suction pump dual filter elements part number 7911-4509EL, the dual filters are mounted on the suction side of the pump, located in the under-carriage of the machine. Next, check the tank oil level.

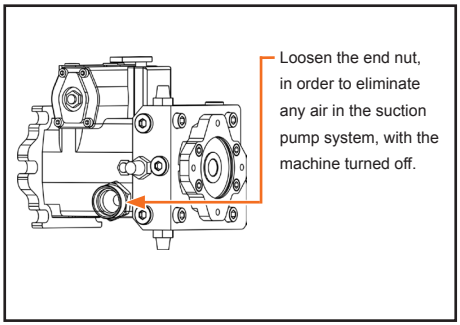


Figure 145

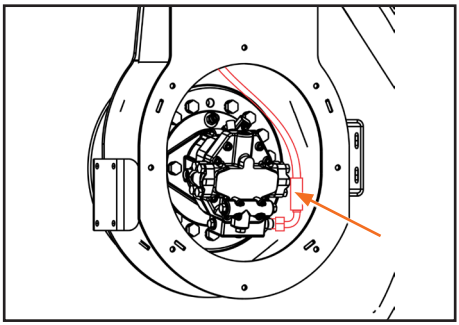


Figure 146

8.6 - Spraying system

The useful life and reliability of the spraying system depends on the reaction of the product being sprayed on the sprayer's components raw base materials. Therefore, it is extremely important to do a complete wash-down of the system at the end of each working day, and when there is a change of product.

The ideal situation is to do a partial system pre-wash in the field, in order to remove excess product residue, before the final and complete system wash-down.

8.7 - Wash-down procedure

- Wash-down the main tank with a strong water jet, then refill it with approximately 400 liters of water.
- With the spraying system closed-off, turn on the spray pump and run it at approximately 1800 rpm, circulating water through the pump several times.
- Turn on and off individual spray sections for several minutes, simultaneously washing down all components with clean water.
- Lastly, empty out the main tank content using the spray nozzles.

8.8 - Suction filter element Cleaning

The filter element needs to be cleaned out after each full tank application. To clean, follow these steps:

1 - Position the valve in the central position (A) (Figure 147);

2 - Position the five-way valve in the closed position (B) (Figure 148);

3 - Remove the butterfly nut with a yellow top (C) (Figure 147);

4 - Loosen the nut (D) (Figure 149) and remove the lower part of the filter;

5 - Remove the filter element (E) (Figure 149), wash it in running water and re-mount the components in the reverse order.

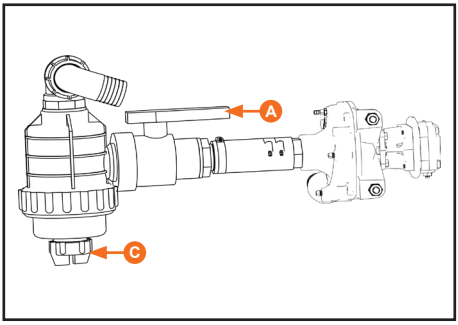


Figure 147

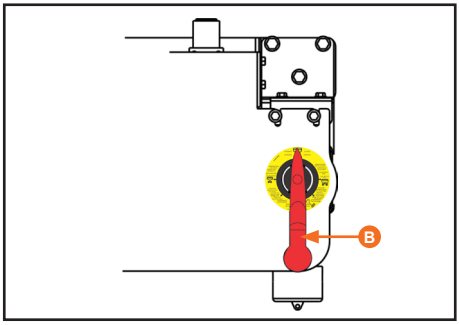


Figure 148

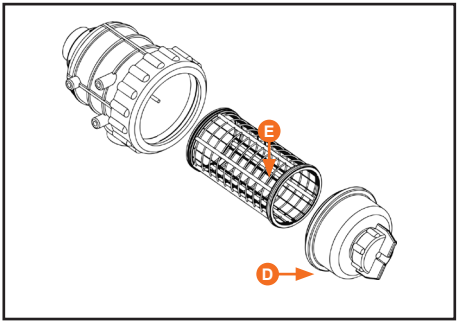


Figure 149

NOTE!
Verify that the valve located before the filter is open before turning on the pump.

8.9 - In-line filter element cleaning procedure

The in-line filter element should be cleaned at the end of each working day. To proceed with the cleaning, follow these steps:

1 - Close in-line filter valve (A) (Figure 150);

2 - Open the cock-valve and allow the fluid to drain (B) (Figure 150);

3 - Remove the filter nut (E) and cup (C) (Figure 150);

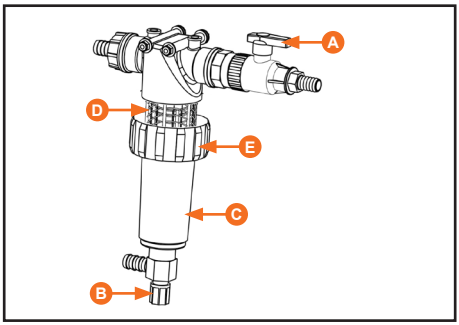


Figure 150

4 - Remove the filter and proceed with the wash-down of the filtering element (D) (Figure 150);

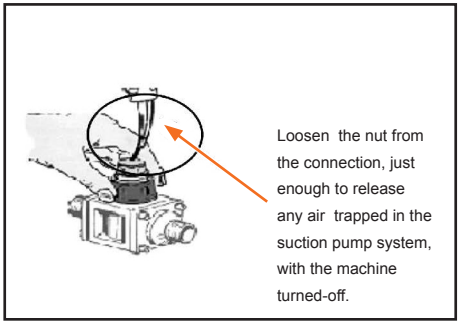
5 - Reassemble and tighten the necessary hardware.

NOTE!
When the agricultural defensive product has a high viscosity, with a slow dilution, or if the main tank was filled at dikes, ponds or lakes, the element cleaning should be done with greater frequency. In these cases the directive is to clean-up the suction filter and the in-line filter after each solution tank application.

8.10 - Daily maintenance or after the end of each working day

Be careful to avoid twisting the connection wires when performing this operation, disconnect it from the system (Figure 151).

Remove the quick-disconnect unit from the body (Figure 152).


Loosen the nut from the connection, just enough to release any air trapped in the suction pump system, with the machine turned-off.
Figure 151

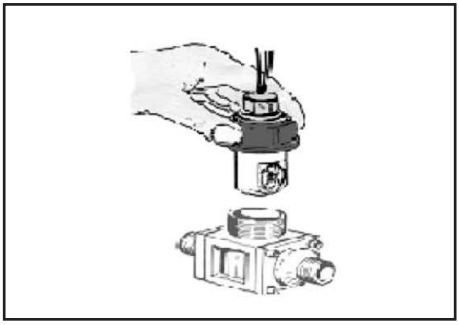


Figure 152

Use clean water to wash-off all impurities from the main turbine body (Figure 153).

If possible, use water to wash-off the flowmeter body (Figure 154).

Figure 153

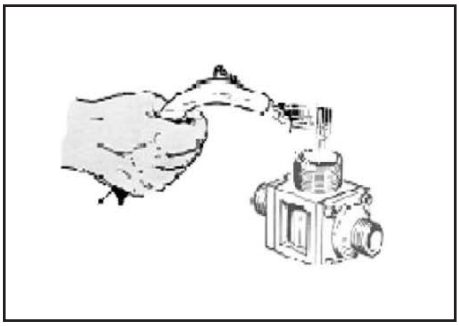


Figure 154

Use compressed air in order to verify that the turbine spins freely. Reinstall the turbine assembly into the quick-disconnect flowmeter body, manually tightening it (do not use tools); observing the correct placement and orientation.

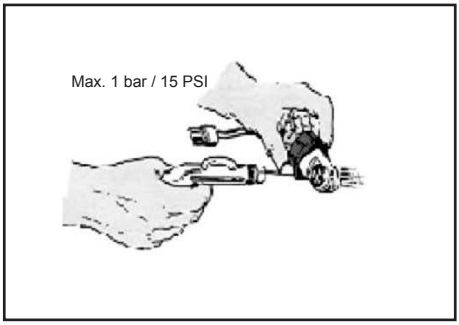


Figure 155

8.11 - Main electrical panel

Main electrical panel									
FUSES: On the fuses below, the referred rating is the maximum allowable current									
15	Reversing alarm	15	Rear roof lights	15	Pneumatic seat	5	Available relay	30	Start/stop
15	Right low beam	15	Front left roof light	15	Roof light	15	Product mixer	30	Horn
15	Lighter/Auto-Pilot Emergency	15	Front right roof light	15	Cabin light	15	Column - start contact	60	A/C unit
20	Windshield wipers	15	Chassis lights	15	Steering column	15	Board output contact		
20	Available contact	15	Boom carriage frame lights	15	A/C speed	15	Wiper washer		
10	A/C contact central weather station	15	Radio/brake lights	10	Joystick	10	Pneumatic seat		
5	Relay contact	15	Left low beam	15	Hydraulic box	10	Spray valve supply voltage		
10	Injector	20	High beams	15	Front central roof lights	5	Topper supply volts		
RELAYS: The relays shown here, all use the same model option (R1-R31), 12V/30A)		R24	Stop	R22	Contact	R12	Start	R11	Contact
		R23	Wiper- 2nd speed	R21	Cabin ceiling lamp	R10	Left front roof light.	R09	Open contact
R31	Product mixer	R20	A/C compressor	R19	Front roof lights	R08	Right front roof light.	R07	Right low beam
R29	Application controller	R18	A/C speed 3	R17	Rear roof lights	R06	Reversing lights	R05	Wiper- 1 st. speed
R27	Wiper washer	R16	A/C speed 2	R15	Chassis lights	R04	Left low beam	R03	Horn
R25	Circuit board output: on/off	R14	A/C speed 1	R13	Booms carriage frame lights	R02	High beams	R01	Injector/ invertor
R26	Unused relay								

Table 10

8.12 - Special cares

COMPONENTS	TYPE	SPECIFICATION	DESCRIPTION	QUANTITY
Diesel engine	Lubricant oil	API-CH4 ACEA-E3	ST MULTI SAE 10W30	Max. 8 liters w/o filter (4 cyl. engine)
			ST MOTORS SAE 15W40	Max. 17 liters w/o filter (6 cyl. engine)
Engine oil filter (6.10T)			MWM 905411880022 (7911-4309-FO)	01
Engine oil filter (6.10T)			MWM 9.0541.15.1.0020 (7911-4309-FC)	01
Air filter	Dry disposable filter	External primary element	MANN - C 20 457 (7911-4360)	01
		Internal secondary element	CF 933 (7911-4361)	
Transmission	Hydraulic oil	ISO VG 68 (DIN 51524/2)	ST OIL ISO 68	140 litros
Ind. oil(booms, steering,spraying	Hydraulic oil	ISO VG 68 (DIN 51524/2)		80 litros
Auto-filtering filter	Disposable filter		PARKER (936747) 7911-4236)	01
Industrial return filter	Disposable filter		PARKER (936878) 7911-4351	01
Transmission filter	Disposable screen filter		DONALDSON (P62208) 7911-4509-EL	02
Hyd. tank vent filter	Disposable screen filter		RACOR PARKER RH 2010 C (7911-4235)	02
Grease fittings	Grease	Litho based NGLI-2	TEXACO - Multifak EP2 PETROBRÁS - Lubrax GMA 2 EP IPIRANGA - IPIFLEX 2 PETROBRAS - TUTELA JOTA MP - 2	-
Reduction gears	Lubricant Oil	ISO VG 220 ANP 0291	SPARTAM E	6 litros

Table 11

9 - TROUBLESHOOTING

PROBLEMS	POSSIBLE SOLUTIONS
Engine will not start.	Check diesel oil level. Check battery charge. Check fuses in electric main panel. Check cable grounding.
Spraying system will not operate.	Check the level of the solution main tank. Check valve lever position. Check that the suction butterfly nut is properly seated. Check for connection leakages.
Speedometer not showing speed.	Verify the distance between the wheel sensor and the flange. Verify speed sensor is tight and secure.
Product mixer has no suction, not loading product.	Verify that spray pump is working. Check the valve lever position. Check the flask-washer valve lever position. Accelerate the machine to about 2000 rpm.
Booms not fully extending.	Verify that the boom braking cylinders have been adjusted properly.
Ladder will not open or close.	Immediately turn off the machine and check the oil levels. Check that the hydraulic reservoir valve lever is in the “open” position.
Pneumatic suspension with low air pressure.	Inspect lines and connections for possible leaks.

Table 12

10 - SCREW TORQUE SPECS

Torque table specs for screws, to be used on the Imperador 3100.

Metric thread	Material specs per DIN 267 F1.3			
	6.9	8.8	10.9	12.9
M6	8	9	13	15
M8	18	22	31	40
M10	40	45	62	75
M12	70	80	110	135
M14	110	125	170	205
M16	160	190	270	320
M18	225	260	365	435
M20	315	365	515	615
M22	420	490	695	830
M24	535	635	890	1070
M27	800	935	1350	1600
M30	1070	1290	1780	2140

Table 13

NOTE!
In case there is a specific torque requirement, it will be notably labeled at the specific location.

11 - NOZZLE SPECIFICATION TABLES

11.1 - Stara spray tip with ultra low drift

Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles km/h									
				6	8	10	12	14	16	18	20	25	30
015	1	G	0.35	70	53	42	35	30	26	23	21	17	14
	2	G	0.49	98	74	59	49	42	37	33	29	24	20
	3	**M**	**0.60**	120	90	72	60	51	45	40	36	29	24
	4	M	0.69	138	104	83	69	59	52	46	41	33	28
	5	M	0.77	154	116	92	77	66	58	51	46	37	31
	6	M	0.85	170	128	102	85	73	64	57	51	41	34
	7	M	0.92	184	138	110	92	79	69	61	55	44	37
	8	M	0.98	196	147	118	98	84	74	65	59	47	39
02	1	MG	0.46	92	69	55	46	39	35	31	28	22	18
	2	G	0.65	130	98	78	65	56	49	43	39	31	26
	3	**M**	**0.80**	160	120	96	80	69	60	53	48	38	32
	4	M	0.92	184	138	110	92	79	69	61	55	44	37
	5	M	1.03	206	155	124	103	88	77	69	62	49	41
	6	M	1.13	226	170	136	113	97	85	75	68	54	45
	7	M	1.22	244	183	146	122	105	92	81	73	59	49
	8	M	1.31	262	197	157	131	112	98	87	79	63	52
025	1	MG	0.58	116	87	70	58	50	44	39	35	28	23
	2	G	0.82	164	123	98	82	70	62	55	49	39	33
	3	**M**	**1.00**	200	150	120	100	86	75	67	60	48	40
	4	M	1.15	230	173	138	115	99	86	77	69	55	46
	5	M	1.29	258	194	155	129	111	97	86	77	62	52
	6	M	1.41	282	212	169	141	121	106	94	85	68	56
	7	M	1.53	306	230	184	153	131	115	102	92	73	61
	8	M	1.63	326	245	196	163	140	122	109	98	78	65
03	1	MG	0.69	138	104	83	69	59	52	46	41	33	28
	2	G	0.98	196	147	118	98	84	74	65	59	47	39
	3	**M**	**1.20**	240	180	144	120	103	90	80	72	58	48
	4	M	1.39	278	209	167	139	119	104	93	83	67	56
	5	M	1.55	310	233	186	155	133	116	103	93	74	62
	6	M	1.70	340	255	204	170	146	128	113	102	82	68
	7	M	1.83	366	275	220	183	157	137	122	110	88	73
	8	M	1.96	392	294	235	196	168	147	131	118	94	78
04	1	MG	0.92	184	138	110	92	79	69	61	55	44	37
	2	G	1.31	262	197	157	131	112	98	87	79	63	52
	3	**M**	**1.60**	320	240	192	160	137	120	107	96	77	64
	4	M	1.85	370	278	222	185	159	139	123	111	89	74
	5	M	2.07	414	311	248	207	177	155	138	124	99	83
	6	M	2.26	452	339	271	226	194	170	151	136	108	90
	7	M	2.44	488	366	293	244	209	183	163	146	117	98
	8	M	2.61	522	392	313	261	224	196	174	157	125	104
05	1	MG	1.15	230	173	138	115	99	86	77	69	55	46
	2	G	1.63	326	245	196	163	140	122	109	98	78	65
	3	**M**	**2.00**	400	300	240	200	171	150	133	120	96	80
	4	M	2.31	462	347	277	231	198	173	154	139	111	92
	5	M	2.58	516	387	310	258	221	194	172	155	124	103
	6	M	2.83	566	425	340	283	243	212	189	170	136	113
	7	M	3.06	612	459	367	306	262	230	204	184	147	122
	8	M	3.27	654	491	392	327	280	245	218	196	157	131
06	1	EG	1.39	278	209	167	139	119	104	93	83	67	56
	2	G	1.96	392	294	235	196	168	147	131	118	94	78
	3	**G**	**2.40**	480	360	288	240	206	180	160	144	115	96
	4	M	2.77	554	416	332	277	237	208	185	166	133	111
	5	M	3.10	620	465	372	310	266	233	207	186	149	124
	6	M	3.39	678	509	407	339	291	254	226	203	163	136
	7	M	3.67	734	551	440	367	315	275	245	220	176	147
	8	M	3.92	784	588	470	392	336	294	261	235	188	157
08	1	EG	1.85	370	278	222	185	159	139	123	111	89	74
	2	MG	2.61	522	392	313	261	224	196	174	157	125	104
	3	**G**	**3.20**	640	480	384	320	274	240	213	192	154	128
	4	M	3.70	740	555	444	370	317	278	247	222	178	148
	5	M	4.13	826	620	496	413	354	310	275	248	198	165
	6	M	4.53	906	680	544	453	388	340	302	272	217	181
	7	M	4.89	978	734	587	489	419	367	326	293	235	196
	8	M	5.23	1046	785	628	523	448	392	349	314	251	209

Table 14

11.2 - Stara spray tip with ultra low drift

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

Specifications	
Application	Weed control
Pattern	Flat fan jet
Technology	Air induction
Material	Polyoxymethylene
Angle	120°
Pressure range	1 to 8 bar
Configuration	Tips with FastCap
Application range	
Contact via foliage	Good under high pressure
Systemic via foliage	Excellent
Soil application	Excellent
Drift Control	Excellent

Low drift, dual air eduction technology			
	Wide fan-out spraying for better target coverage.	Ideal for herbicide applications of pre and post-emergence.	Developed to eliminate droplet drifting, without sacrificing the target coverage.

11.3 - Stara spray tip with broad range

Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles								
				km/h								
				6	8	10	12	14	16	18	20	25
015	1	M	0,346	69	52	41	34	29	26	23	20	16
	2	F	0,490	98	73	58	49	42	36	32	29	23
	3	F	0,600	120	90	72	60	51	45	40	36	28
	4	F	0,693	138	103	83	69	59	52	46	41	33
	5	F	0,775	154	116	93	77	66	58	51	46	37
02	1	M	0,462	92	69	55	46	39	34	30	27	22
	2	F	0,653	130	98	78	65	56	49	43	39	31
	3	F	0,800	160	120	96	80	68	60	53	48	38
	4	F	0,924	184	138	110	92	79	69	61	55	44
	5	F	1,033	206	154	123	103	88	77	68	62	49
025	1	M	0,577	115	86	69	57	49	43	38	34	27
	2	F	0,816	163	122	98	81	70	61	54	49	39
	3	F	1,000	200	150	120	100	85	75	66	60	48
	4	F	1,155	230	173	138	115	99	86	77	69	55
	5	F	1,291	258	193	154	129	110	96	86	77	62
03	1	M	0,693	138	103	83	69	59	52	46	41	33
	2	M	0,980	196	147	117	98	84	73	65	58	47
	3	F	1,200	240	180	144	120	102	90	80	72	57
	4	F	1,386	277	207	166	138	118	103	92	83	66
	5	F	1,549	309	232	185	154	132	116	103	93	74
04	1	G	0,924	184	138	110	92	79	69	61	55	44
	2	M	1,306	261	196	156	130	112	98	87	78	62
	3	M	1,600	320	240	192	160	137	120	106	96	76
	4	F	1,848	369	277	221	184	158	138	123	110	88
	5	F	2,066	413	309	247	206	177	154	137	123	99
05	6	G	1,155	230	173	138	115	99	86	77	69	55
	2	M	1,633	326	244	196	163	140	122	108	98	78
	3	M	2,000	400	300	240	200	171	150	133	120	96
	4	M	2,309	461	346	277	230	197	173	154	138	110
	5	F	2,582	516	387	309	258	221	193	172	154	123
06	1	G	1,386	277	207	166	138	118	103	92	83	66
	2	G	1,960	391	293	235	196	168	147	130	117	94
	3	M	2,400	480	360	288	240	205	180	160	144	115
	4	M	2,771	554	415	332	277	237	207	184	166	133
	5	M	3,098	619	464	371	309	265	232	206	185	148
08	1	MG	1,848	369	277	221	184	158	138	123	110	88
	2	G	2,613	522	391	313	261	224	196	174	156	125
	3	M	3,200	640	480	384	320	274	240	213	192	153
	4	M	3,695	739	554	443	369	316	277	246	221	177
	5	M	4,131	826	619	495	413	354	309	275	247	198

Table 15

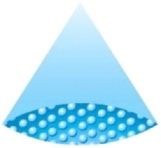
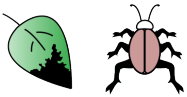
11.3 - Stara spray tip with broad fan-out

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

Specifications	
Tip	SLA
Application	General
Pattern	Flat fan jet
Technology	Elliptic orifice
Material	Polyoxymethylene
Angle	110°
Pressure range	2 to 4 bar
Configuration	Tip/Tip with quick-disconnect connection

Application guide	
Tip	SLA
Foliage contact	Very good
Systemic foliage	Good
Soil herbicides	Good
Drift control	-

Ideal for large coverage applications

			
	110° angle, without pre-orifice.	Used in general applications.	Greater droplet size selection, due to applications pressures, thus allowing the application of systemic products at lower pressures and, in contact at higher pressures.

11.4 - Stara spray tip with hollow cone

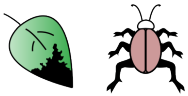
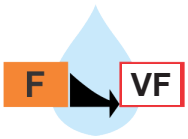
Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles								
				km/h								
				6	8	10	12	14	16	18	20	25
SCV2	3	MF	0,132	26	19	15	13	11	9	8	7	6
	4	MF	0,153	30	23	18	15	13	11	10	9	7
	5	MF	0,171	34	25	20	17	14	12	11	10	8
	6	MF	0,187	37	28	22	18	16	14	12	11	9
	7	MF	0,200	40	30	24	20	17	15	13	12	9
	10	MF	2,400	48	36	28	24	20	18	16	14	11
SCV3	3	MF	1,990	39	29	23	19	17	14	13	12	9
	4	MF	0,229	45	34	27	22	19	17	15	13	11
	5	MF	0,257	51	38	30	25	22	19	17	15	12
	6	MF	0,281	56	42	33	28	24	21	18	16	13
	7	MF	0,300	60	45	36	30	25	22	20	18	14
	10	MF	0,360	72	54	43	36	30	27	24	21	17
SCV4	3	F	0,265	53	39	31	26	22	19	17	15	12
	4	MF	0,306	61	45	36	30	26	22	20	18	14
	5	MF	0,342	68	51	41	34	29	25	22	20	16
	6	MF	0,375	75	56	45	37	32	28	25	22	18
	7	MF	0,400	80	60	48	40	34	30	26	24	19
	10	MF	0,480	96	72	57	48	41	36	32	28	23
SCV6	3	F	0,397	79	59	47	39	34	29	26	23	19
	4	MF	0,459	91	68	55	45	39	34	30	27	22
	5	MF	0,513	102	77	61	51	44	38	34	30	24
	6	MF	0,562	112	84	67	56	48	42	37	33	27
	7	MF	0,600	120	90	72	60	51	45	40	36	28
	10	MF	0,720	144	108	86	72	61	54	48	43	34
SCV8	3	F	0,530	106	79	63	53	45	39	35	31	25
	4	F	0,612	122	91	73	61	52	45	40	36	29
	5	MF	0,684	136	102	82	68	58	51	45	41	32
	6	MF	0,749	149	112	89	74	64	56	49	45	36
	7	MF	0,800	160	120	96	80	68	60	53	48	38
	10	MF	0,960	192	144	115	96	82	72	64	57	46
SCV9	3	F	0,596	119	89	71	59	51	44	39	35	28
	4	F	0,688	137	103	82	68	59	51	45	41	33
	5	F	0,770	154	115	92	77	66	57	51	46	37
	6	MF	0,843	168	126	101	84	72	63	56	50	40
	7	MF	0,919	183	137	110	91	78	68	61	55	44
	10	MF	1,080	216	162	129	108	92	81	72	64	51
SCV10	3	F	0,662	132	99	79	66	56	49	44	39	31
	4	F	0,765	153	114	91	76	65	57	51	45	36
	5	F	0,855	171	128	102	85	73	64	57	51	41
	6	F	0,937	187	140	112	93	80	70	62	56	45
	7	MF	1,010	202	151	121	101	86	75	67	60	48
	10	MF	1,200	240	180	144	120	102	90	80	72	57
SCV12	3	F	0,795	159	119	95	79	68	59	53	47	38
	4	F	0,918	183	137	110	91	78	68	61	55	44
	5	F	1,026	205	153	123	102	87	76	68	61	49
	6	F	1,124	224	168	134	112	96	84	74	67	54
	7	F	1,210	242	181	145	121	103	90	80	72	58
	10	MF	1,440	288	216	172	143	123	108	96	86	69
SCV18	3	F	1,180	236	177	141	118	101	88	78	70	56
	4	F	1,370	274	205	164	136	117	102	91	82	65
	5	F	1,530	306	229	183	152	131	114	102	91	73
	6	F	1,680	336	252	201	167	144	126	112	100	80
	7	F	1,810	362	271	217	180	155	135	120	108	86
	10	MF	2,160	432	324	259	215	185	162	144	129	103

Table 16

11.4 - Stara spray tip with hollow cone

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

Specifications	
Tip	SLA
Application	Pests and diseases
Pattern	Conic hollow jet
Technology	Swirl (spiral movement)
Material	Polyoxymethylene
Angle	80°
Pressure range	3 to 10 bar
Configuration	Tip
Application guide	
Tip	SCV
Foliage contact	Excellent
Systemic foliage	Good
Soil herbicides	-
Drift control	-

Produces an 80° conic jet			
			
	80° angle, hollow conic jet.	Recommended in the applications of insecticides e fungicides at low rates.	Droplet sizes vary between fine and very fine. Ideal for contact products under optimum climatic conditions.

11.5 - Stara guardian spray tip

Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles									
				km/h									
				6	8	10	12	14	16	18	20	25	30
01	1	G	0.23	46	35	28	23	20	17	15	14	11	9
	2	G	0.33	66	50	40	33	28	25	22	20	16	13
	3	**M**	**0.40**	80	60	48	40	34	30	27	24	19	16
	4	M	0.46	92	69	55	46	39	35	31	28	22	18
	5	M	0.52	104	78	62	52	45	39	35	31	25	21
	6	M	0.57	114	86	68	57	49	43	38	34	27	23
	7	M	0.61	122	92	73	61	52	46	41	37	29	24
	8	M	0.65	130	98	78	65	56	49	43	39	31	26
015	1	G	0.35	70	53	42	35	30	26	23	21	17	14
	2	G	0.49	98	74	59	49	42	37	33	29	24	20
	3	**M**	**0.60**	120	90	72	60	51	45	40	36	29	24
	4	M	0.69	138	104	83	69	59	52	46	41	33	28
	5	M	0.77	154	116	92	77	66	58	51	46	37	31
	6	M	0.85	170	128	102	85	73	64	57	51	41	34
	7	M	0.92	184	138	110	92	79	69	61	55	44	37
	8	M	0.98	196	147	118	98	84	74	65	59	47	39
02	1	MG	0.46	92	69	55	46	39	35	31	28	22	18
	2	G	0.65	130	98	78	65	56	49	43	39	31	26
	3	**M**	**0.80**	160	120	96	80	69	60	53	48	38	32
	4	M	0.92	184	138	110	92	79	69	61	55	44	37
	5	M	1.03	206	155	124	103	88	77	69	62	49	41
	6	M	1.13	226	170	136	113	97	85	75	68	54	45
	7	M	1.22	244	183	146	122	105	92	81	73	59	49
	8	M	1.31	262	197	157	131	112	98	87	79	63	52
025	1	MG	0.58	116	87	70	58	50	44	39	35	28	23
	2	G	0.82	164	123	98	82	70	62	55	49	39	33
	3	**M**	**1.00**	200	150	120	100	86	75	67	60	48	40
	4	M	1.15	230	173	138	115	99	86	77	69	55	46
	5	M	1.29	258	194	155	129	111	97	86	77	62	52
	6	M	1.41	282	212	169	141	121	106	94	85	68	56
	7	M	1.53	306	230	184	153	131	115	102	92	73	61
	8	M	1.63	326	245	196	163	140	122	109	98	78	65
03	1	MG	0.69	138	104	83	69	59	52	46	41	33	28
	2	G	0.98	196	147	118	98	84	74	65	59	47	39
	3	**M**	**1.20**	240	180	144	120	103	90	80	72	58	48
	4	M	1.39	278	209	167	139	119	104	93	83	67	56
	5	M	1.55	310	233	186	155	133	116	103	93	74	62
	6	M	1.70	340	255	204	170	146	128	113	102	82	68
	7	M	1.83	366	275	220	183	157	137	122	110	88	73
	8	M	1.96	392	294	235	196	168	147	131	118	94	78
04	1	MG	0.92	184	138	110	92	79	69	61	55	44	37
	2	G	1.31	262	197	157	131	112	98	87	79	63	52
	3	**M**	**1.60**	320	240	192	160	137	120	107	96	77	64
	4	M	1.85	370	278	222	185	159	139	123	111	89	74
	5	M	2.07	414	311	248	207	177	155	138	124	99	83
	6	M	2.26	452	339	271	226	194	170	151	136	108	90
	7	M	2.44	488	366	293	244	209	183	163	146	117	98
	8	M	2.61	522	392	313	261	224	196	174	157	125	104
05	1	MG	1.15	230	173	138	115	99	86	77	69	55	46
	2	G	1.63	326	245	196	163	140	122	109	98	78	65
	3	**M**	**2.00**	400	300	240	200	171	150	133	120	96	80
	4	M	2.31	462	347	277	231	198	173	154	139	111	92
	5	M	2.58	516	387	310	258	221	194	172	155	124	103
	6	M	2.83	566	425	340	283	243	212	189	170	136	113
	7	M	3.06	612	459	367	306	262	230	204	184	147	122
	8	M	3.27	654	491	392	327	280	245	218	196	157	131
06	1	EG	1.39	278	209	167	139	119	104	93	83	67	56
	2	G	1.96	392	294	235	196	168	147	131	118	94	78
	3	**G**	**2.40**	480	360	288	240	206	180	160	144	115	96
	4	M	2.77	554	416	332	277	237	208	185	166	133	111
	5	M	3.10	620	465	372	310	266	233	207	186	149	124
	6	M	3.39	678	509	407	339	291	254	226	203	163	136
	7	M	3.67	734	551	440	367	315	275	245	220	176	147
	8	M	3.92	784	588	470	392	336	294	261	235	188	157
08	1	EG	1.85	370	278	222	185	159	139	123	111	89	74
	2	MG	2.61	522	392	313	261	224	196	174	157	125	104
	3	**G**	**3.20**	640	480	384	320	274	240	213	192	154	128
	4	M	3.70	740	555	444	370	317	278	247	222	178	148
	5	M	4.13	826	620	496	413	354	310	275	248	198	165
	6	M	4.53	906	680	544	453	388	340	302	272	217	181
	7	M	4.89	978	734	587	489	419	367	326	293	235	196
	8	M	5.23	1046	785	628	523	448	392	349	314	251	209

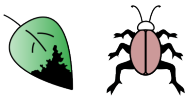
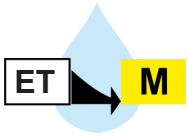
Table 17

11.5 - Stara spray tip type guardian

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

Specifications	
Application	Phytosanitary control
Pattern	Flat fan jet
Technology	Pre-orifice
Material	Polyoxymethylene
Angle	120°
Pressure range	1 a 8 bar
Configuration	Complete with FastCap
Application guide	
Contact via foliage	Excellent
Systemic via foliage	Excellent
Soil application	Very good
Drift Control	Good

Ideal for total area application

			
	Spray angle of 120°, with an inclination of 20°, guaranteeing an uniform distribution and drift control.	Ideal when spraying a wide variety of products such as fungicides, herbicides and insecticides.	Carefully designed to produce medium sized drops under a wide range of pressures.

11.6 - Stara spray tip with low air drift

Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles									
				km/h									
				6	8	10	12	14	16	18	20	25	30
015	1	G	0.35	70	53	42	35	30	26	23	21	17	14
	2	G	0.49	98	74	59	49	42	37	33	29	24	20
	3	**M**	**0.60**	120	90	72	60	51	45	40	36	29	24
	4	M	0.69	138	104	83	69	59	52	46	41	33	28
	5	M	0.77	154	116	92	77	66	58	51	46	37	31
	6	M	0.85	170	128	102	85	73	64	57	51	41	34
	7	M	0.92	184	138	110	92	79	69	61	55	44	37
	8	M	0.98	196	147	118	98	84	74	65	59	47	39
02	1	MG	0.46	92	69	55	46	39	35	31	28	22	18
	2	G	0.65	130	98	78	65	56	49	43	39	31	26
	3	**M**	**0.80**	160	120	96	80	69	60	53	48	38	32
	4	M	0.92	184	138	110	92	79	69	61	55	44	37
	5	M	1.03	206	155	124	103	88	77	69	62	49	41
	6	M	1.13	226	170	136	113	97	85	75	68	54	45
	7	M	1.22	244	183	146	122	105	92	81	73	59	49
	8	M	1.31	262	197	157	131	112	98	87	79	63	52
025	1	MG	0.58	116	87	70	58	50	44	39	35	28	23
	2	G	0.82	164	123	98	82	70	62	55	49	39	33
	3	**M**	**1.00**	200	150	120	100	86	75	67	60	48	40
	4	M	1.15	230	173	138	115	99	86	77	69	55	46
	5	M	1.29	258	194	155	129	111	97	86	77	62	52
	6	M	1.41	282	212	169	141	121	106	94	85	68	56
	7	M	1.53	306	230	184	153	131	115	102	92	73	61
	8	M	1.63	326	245	196	163	140	122	109	98	78	65
03	1	MG	0.69	138	104	83	69	59	52	46	41	33	28
	2	G	0.98	196	147	118	98	84	74	65	59	47	39
	3	**M**	**1.20**	240	180	144	120	103	90	80	72	58	48
	4	M	1.39	278	209	167	139	119	104	93	83	67	56
	5	M	1.55	310	233	186	155	133	116	103	93	74	62
	6	M	1.70	340	255	204	170	146	128	113	102	82	68
	7	M	1.83	366	275	220	183	157	137	122	110	88	73
	8	M	1.96	392	294	235	196	168	147	131	118	94	78
035	1	UG	0.81	162	122	97	81	69	61	54	49	39	32
	2	MG	1.14	228	171	137	114	98	86	76	68	55	46
	3	**G**	**1.40**	280	210	168	140	120	105	93	84	67	56
	4	M	1.62	324	243	194	162	139	122	108	97	78	65
	5	M	1.81	362	272	217	181	155	136	121	109	87	72
	6	M	1.98	396	297	238	198	170	149	132	119	95	79
	7	M	2.14	428	321	257	214	183	161	143	128	103	86
	8	M	2.29	458	344	275	229	196	172	153	137	110	92
04	1	MG	0.92	184	138	110	92	79	69	61	55	44	37
	2	G	1.31	262	197	157	131	112	98	87	79	63	52
	3	**M**	**1.60**	320	240	192	160	137	120	107	96	77	64
	4	M	1.85	370	278	222	185	159	139	123	111	89	74
	5	M	2.07	414	311	248	207	177	155	138	124	99	83
	6	M	2.26	452	339	271	226	194	170	151	136	108	90
	7	M	2.44	488	366	293	244	209	183	163	146	117	98
	8	M	2.61	522	392	313	261	224	196	174	157	125	104
05	1	MG	1.15	230	173	138	115	99	86	77	69	55	46
	2	G	1.63	326	245	196	163	140	122	109	98	78	65
	3	**M**	**2.00**	400	300	240	200	171	150	133	120	96	80
	4	M	2.31	462	347	277	231	198	173	154	139	111	92
	5	M	2.58	516	387	310	258	221	194	172	155	124	103
	6	M	2.83	566	425	340	283	243	212	189	170	136	113
	7	M	3.06	612	459	367	306	262	230	204	184	147	122
	8	M	3.27	654	491	392	327	280	245	218	196	157	131

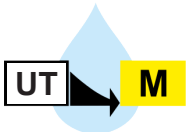
Table 18

11.6 - Stara spray tip with low air drift

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

Specifications	
Application	Phytosanitary control
Pattern	Flat fan jet
Technology	Air induction
Material	Polyoxymethylene
Angle	110°
Pressure range	1 to 8 bar
Configuration	Tips with FastCap
Application guide	
Contact via foliage	Excellent
Systemic via foliage	Excellent
Soil application	Very good
Drift Control	Good

Baixa deriva, tecnologia de dupla edução de ar

			
	Optimized for best performance and highest productivity. Tilted fan allowing for a more uniform coverage and the optimal retention of droplets on the target.	Ideal for applications requiring a larger coverage. Allowing for a faster and more efficient application.	Produces the best coverage, with the most sprayed droplets per liter, as compared to other air induction tips.

11.7 - Stara spray tip with double fan-out

Spray nozzles	Pressure BAR	Drop size	Flow rate (l/min)	l/ha 50cm spacing between nozzles									
				km/h									
				6	8	10	12	14	16	18	20	25	30
02	1	MG	0.46	92	69	55	46	39	35	31	28	22	18
	2	G	0.65	130	98	78	65	56	49	43	39	31	26
	3	**M**	**0.80**	160	120	96	80	69	60	53	48	38	32
	4	M	0.92	184	138	110	92	79	69	61	55	44	37
	5	M	1.03	206	155	124	103	88	77	69	62	49	41
	6	M	1.13	226	170	136	113	97	85	75	68	54	45
	7	M	1.22	244	183	146	122	105	92	81	73	59	49
	8	M	1.31	262	197	157	131	112	98	87	79	63	52
025	1	MG	0.58	116	87	70	58	50	44	39	35	28	23
	2	G	0.82	164	123	98	82	70	62	55	49	39	33
	3	**M**	**1.00**	200	150	120	100	86	75	67	60	48	40
	4	M	1.15	230	173	138	115	99	86	77	69	55	46
	5	M	1.29	258	194	155	129	111	97	86	77	62	52
	6	M	1.41	282	212	169	141	121	106	94	85	68	56
	7	M	1.53	306	230	184	153	131	115	102	92	73	61
	8	M	1.63	326	245	196	163	140	122	109	98	78	65
03	1	MG	0.69	138	104	83	69	59	52	46	41	33	28
	2	G	0.98	196	147	118	98	84	74	65	59	47	39
	3	**M**	**1.20**	240	180	144	120	103	90	80	72	58	48
	4	M	1.39	278	209	167	139	119	104	93	83	67	56
	5	M	1.55	310	233	186	155	133	116	103	93	74	62
	6	M	1.70	340	255	204	170	146	128	113	102	82	68
	7	M	1.83	366	275	220	183	157	137	122	110	88	73
	8	M	1.96	392	294	235	196	168	147	131	118	94	78
04	1	MG	0.92	184	138	110	92	79	69	61	55	44	37
	2	G	1.31	262	197	157	131	112	98	87	79	63	52
	3	**M**	**1.60**	320	240	192	160	137	120	107	96	77	64
	4	M	1.85	370	278	222	185	159	139	123	111	89	74
	5	M	2.07	414	311	248	207	177	155	138	124	99	83
	6	M	2.26	452	339	271	226	194	170	151	136	108	90
	7	M	2.44	488	366	293	244	209	183	163	146	117	98
	8	M	2.61	522	392	313	261	224	196	174	157	125	104
05	1	MG	1.15	230	173	138	115	99	86	77	69	55	46
	2	G	1.63	326	245	196	163	140	122	109	98	78	65
	3	**M**	**2.00**	400	300	240	200	171	150	133	120	96	80
	4	M	2.31	462	347	277	231	198	173	154	139	111	92
	5	M	2.58	516	387	310	258	221	194	172	155	124	103
	6	M	2.83	566	425	340	283	243	212	189	170	136	113
	7	M	3.06	612	459	367	306	262	230	204	184	147	122
	8	M	3.27	654	491	392	327	280	245	218	196	157	131
06	1	EG	1.39	278	209	167	139	119	104	93	83	67	56
	2	G	1.96	392	294	235	196	168	147	131	118	94	78
	3	**G**	**2.40**	480	360	288	240	206	180	160	144	115	96
	4	M	2.77	554	416	332	277	237	208	185	166	133	111
	5	M	3.10	620	465	372	310	266	233	207	186	149	124
	6	M	3.39	678	509	407	339	291	254	226	203	163	136
	7	M	3.67	734	551	440	367	315	275	245	220	176	147
	8	M	3.92	784	588	470	392	336	294	261	235	188	157
08	1	EG	1.85	370	278	222	185	159	139	123	111	89	74
	2	MG	2.61	522	392	313	261	224	196	174	157	125	104
	3	**G**	**3.20**	640	480	384	320	274	240	213	192	154	128
	4	M	3.70	740	555	444	370	317	278	247	222	178	148
	5	M	4.13	826	620	496	413	354	310	275	248	198	165
	6	M	4.53	906	680	544	453	388	340	302	272	217	181
	7	M	4.89	978	734	587	489	419	367	326	293	235	196
	8	M	5.23	1046	785	628	523	448	392	349	314	251	209

Table 19

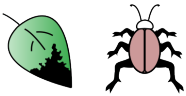
11.7 - Stara spray tip with double fan-out

	Extremely fine		Fine		Thick		Extremely thick
	Very fine		Medium		Very thick		Ultra thick

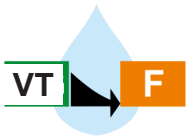
Specifications	
Application	Phytosanitary control
Pattern	Flat fan jet
Technology	Air induction
Material	Polyoxymethylene
Angle	110°
Pressure range	2 to 8 bar
Configuration	Tips with FastCap
Application Guide	
Contact via foliage	Excellent
Systemic via foliage	Excellent
Soil application	-
Drift Control	Good

Excellent coverage and low drift

Double fan-out with an air induction providing for an uniform coverage and reduced drifting.



Ideal for applications where there is a demand for greater coverage.



With a designed precision for best coverage, with highest number of droplets per liter sprayed as compared to other air induction tips.

WARRANTY CLAIMS

Must be kept on file

The information contained in this warranty claim has been written, in a generalized way, thus covering your new Stara implement. Should there be the need for additional information regarding the use of your implement, we suggest reading the instruction manual.

All the information contained in this warranty claims are based on the last available data at the time of its publication, being subject to changes without any previous warnings.

Please be aware that, any modifications made to your Stara implement could affect your productivity, safety and operation.

With these modifications, you could jeopardize loosing your contractual warranty agreement issued by Stara S/A Indústria de Implementos Agrícolas.

When purchasing your new Stara implement, demand that your authorized dealership chain completely fill-out this warranty claim, along with explanations regarding the warranty issued by Stara S/A Indústria de Implementos Agrícolas.

STARA'S IMPLEMENTS WARRANTY

1 - BASIC COVERAGE PERIOD

Stara S/A Indústria de Implementos Agrícolas, through its authorized dealership chain, guarantees its implements under normal usage conditions, against parts manufacturing defects or installation, for a total period as defined in the chart below.

IMPLEMENTS	WARRANTY PERIOD
Self-propelled	12 months or 1,000 hours
Tractors	12 months or 1,000 hours
Technology equipment	12 months
Spreaders	6 months
Headers	6 months
Sprayers - Drawn/Hitched	6 months
Planters and Seeders	6 months
Other products	6 months
Original Stara parts and accessories	6 months

The first 90 (ninety) days refer to a legal warranty as defined by the Brazilian courts and, an additional contractual period issued freely by Stara S/A Indústria de Implementos Agrícolas.

The warranty begins at the date of issue of the implement's sales invoice, having as its end user, the first owner.

- Note

  The warranty time-frame for parts and components replaced during the basic warranty period, expire on the end date of the contractual warranty as issued by Stara S/A The Agricultural Implements Company.

1.1 - Accessories

Some implements can be purchased, through the authorized dealerships with pre-installed accessories.

When dealing with accessories, even though genuine Stara parts, its warranty period has no relationship with the implement's warranty time-frame.

Thus, when purchasing your implement, demand all sales receipts for the accessories which were installed on the implement, which will allow you to partake in the said warranties of these items.

For detailed information regarding warranty coverage of genuine Stara accessories, consult item 7 of this document.

1.2 - Transferable warranty

This warranty is totally transferable to the subsequent owners of the implement, as long as the new owner has possession of the original warranty claims document, where all required periodic maintenance are logged, and the starting date of the warranty.

2 - LIMITED WARRANTY COVERAGE

Tires, inner tubes and injection pumps are only directly guaranteed by their manufactures, of the referred components. Stara, through its authorized dealerships, limits itself to only forwarding the respective guarantees to the manufactures (or their authorized distributors) of said components. Stara does not hold itself responsible for a positive or negative solution to a complaint which is presented by the owner. Substituting complete assemblies like an engine, transmission or axles, will only be done if there is no possibility of a partial repair by a technician.

3 - NATURAL WEAR AND TARE PARTS

Substituting parts and components during their normal usage on the implement and, due to natural wear which is common to all parts and components, is not covered by the warranty, as long as it is not related to a manufacturing defect.

Examples of natural wear and tare parts: electrical items; filters; belts; bearings; quick-disconnects; cutting bars; wear shield plates; slide plates; chains; grain tank canvas cover; wind-shield wipers; brake pads, disc brakes and brake shoes; tires; clutch plate, clutch discs and bearings.

4 - ITEMS AND SERVICES NOT COVERED BY THE WARRANTY

Factors out of the control of Stara S/A The Agricultural Implements Company.

(I) Repairs and adjustments resulting from improper use of the implement (examples: over-speeding the engine, overloading, improper operations), negligence, modifications, alterations, abuses, accidents, improper adjustments and repairs, using non-genuine parts and any other usage contrary to specifications listed on the instruction manual.

(II) Damages to the implement of any sort due to adverse environmental conditions, such as acid rain, reaction to chemical substances, tree sap, salinity, hail, strong winds, lightning, flooding, impact damage by any objects and any other acts of nature.

(III) Failure to perform maintenance on the implement, necessary repairs and adjustments due to improper maintenance (done by a third party or any other non-authorized dealerships), failure to use the implement, the use of fluids (and lubricants) not recommended by Stara S/A The Agricultural Implements Company.

(IV) Repairs and adjustments resulting from the use of fuel with poor quality and/or that has been adulterated.

4.1 - Additional expenditures

The warranty does not cover any expenditures for transporting the implement and loss of profits.

4.2 - Adulterated hourmeter

Any factors or evidence which proves that an hourmeter has been changed and tampered with, will give just cause for the cancellation and termination of the warranty.

4.3 - Owner is responsible for maintenances

Engine adjustments, lubrication, cleaning, filter replacements, fluids, natural wearing parts, are some of the items used by the implement on their scheduled maintenances. Thus, these are charges incurred by the owner of the implement.

5 - OWNER'S RESPONSIBILITIES

5.1 - Getting warranty service

The owner has the responsibility to deliver his implement for repairs at any Stara authorized dealership, in order to maintain his warranty.

Fundamental conditions when honoring the warranty:

(I) The claim must be directed to a Stara authorized dealership, after it has been established that there is evidence of a nonconformity.

(II) The warranty document for the implement must be presented and, that it be properly filled-out, along with it all maintenance records as required by the scheduled maintenances.

5.2 - Maintenance

It is the owner's responsibility for the proper operation, required operator training of those who will operate the implement, not limiting it to those required by law, like maintenance and care, according to the instructions listed in the instruction manual.

6 - HOW TO OBTAIN TECHNICAL ASSISTANCE

6.1 - Client satisfaction

Stara S/A The Agricultural Implements Company, is constantly looking for ways to improve its implements and to client satisfaction.

All Stara authorized dealerships maintain a full arsenal of tools, equipment and technicians highly trained by Stara S/A The Agricultural Implements Company, so that your implement has the best repairs and services, all with a high standard of quality. Thus, when needed seek your nearest Stara authorized dealership.

6.2 - Required information

In case there is the need to repair your Stara implement, keep on-hand the following information and documents:

(I) A clear description of the nonconformity, including the conditions under which it occurred.

(II) Warranty claim document, instruction manual and all receipts which need to be legible, as proof for oil changes not done by Stara authorized dealerships.

- Important

  The warranty claim document is required to have, a logged registry (stamps) of all check-ups performed, according to the scheduled hours and time-frames.

  All receipts needed as proof of oil changes not done by Stara approved dealerships.

  It is the implement's owner's responsibility to retain all receipts in a legible manner, as proof for an oil substitution which was done by a third party, and that it is recommended by Stara S/A The Agricultural Implements Company, according to guidelines written in the instruction manual.

  The receipts mentioned above will be required in situations where proof of oil changes are necessary. Thus, when selling the implement, do not forget to supply these receipts to the new owner. If you are purchasing the implement, request this documentation from the previous owner.

- Important

  In the event that you need to repair the implement's engine, the above mentioned documents will be required for the warranty claim.

6.3 - Scheduled maintenance program

The scheduled maintenance program for the implement is written in the instruction manual.

In this plan you will find all the required and necessary information for the best operation of your Stara

implement.

- Important

  All and any costs with reference to labor costs and parts and components replacement foreseen in the maintenance program will be the responsibility of the implement's owner, except for changes paid for by the manufacturer.

6.4 - Implement's scheduled maintenance plan

All scheduled maintenances listed in the instruction manual, will be done exclusively by a Stara authorized dealership, also it shall be logged-in on the scheduled maintenance pages, which are found at the end of this warranty claim.

The simple changing of oil and filters, as shown on the scheduled maintenance guidelines, does not omit the mandatory requirements for regular scheduled maintenances.

Not complying with the regular scheduled maintenance program can compromise the proper operation of your Stara implement, leading to possible nonconformities, which can be prevented by implementing a regular scheduled maintenance program.

Stara S/A The Agricultural Implements Company reserves the right to make that judgment. Therefore, we recommend that the whole scheduled maintenance program be fulfilled, so that such situations can be avoided.

7 - WARRANTY OF GENUINE STARA REPLACEMENT PARTS

7.1 - Purchased and installed at an authorized Stara dealerships

In order to maintain the warranty of the genuine Stara replacement parts, they are required to be purchased and installed by authorized Stara dealerships.

So that the warranty can be honored, the original receipt for the genuine Stara replacement part, along with the Service Order for the installation of the replacement part on the implement will be required as proof for the warranty period.

7.2 - Third party installation of purchased Stara authorized replacement parts

Third party installation of purchased Stara authorized replacement parts, are covered exclusively under the legal warranty of 90 (ninety) days, against defects when proven to be due to the manufacturing defects.

So that the warranty can be honored, the original authorized dealer receipt of purchase will be required, to prove its validity for the warranty period.

- Important

  The warranty of the Stara genuine replacement parts, like the implement's warranty, do not cover the natural wear of the parts, as long as it does not deal with manufacturing defects.

  Stara will only honor warranties of genuine parts purchased at authorized dealerships.

8 - WARRANTY OF GENUINE STARA ACCESSORIES

8.1 - Purchased and installed at Stara authorized dealerships

In order to honor the warranty of the Stara accessories, they must be purchased and installed by authorized Stara dealerships. So that the warranty can be honored, the original receipt for the Stara genuine accessory, along with the Service Order for its installation on the implement will be required as proof for the warranty period

8.2 - Third party installation of purchased Stara authorized accessories

Third party installation of purchased Stara authorized genuine accessories, are covered exclusively under the legal warranty of 90 (ninety) days, against defects when proven to be due to the manufacturing defects.

So that the warranty can be honored, the original authorized dealer receipt of purchase will be required, to prove its validity for the warranty period.

- Important

  The warranty period for genuine Stara accessories is exclusive and has nothing to do with the warranty period of the implement.

  The warranty of the Stara genuine accessories, like the implement's warranty, do not cover the natural wear of the parts, as long as it does not deal with manufacturing defects.

9 - IMPORTANT INFORMATION

9.1 - Accessories, replacement parts and modifications to your implement Stara

A vast number of replacement parts and accessories, but not genuine to Stara implements are available on the market. Using these accessories or replacement parts, can affect the safety and operation of your Stara implement, even though that these products have been approved by current local laws. Stara S/A The Agricultural Implements Company, does not accept responsibility for and does not warrant these replacement parts or accessories, nor their installation or usage.

The implement should not be modified with non-genuine products. Modifications with products non-genuine Stara can affect its performance, safety and durability.

Damages or problems which are the result of these types of modifications will not be covered by the warranty.

10 - SCHEDULED MAINTENANCE LOG

Implements	Technical Delivery Check-up	100 hours Check-up	250 hours Check-up	500 hours Check-up	1000 hours or 1 year Check-up	End of warranty visit
Self-propelled	x		x	x	x	1 year or 1000 hours
Sprayers Drawn/Hitched	x					6 months
Planters and Seeders	x					6 months
Spreaders	x					6 months
Headers	x					6 months
Technology equipment	x					1 year
Tractors	x	x	x	x	x	1 year or 1000 hours
All other implements	x					6 months

WARRANTY REGISTRATION
CUSTOMER COPY

SELF-PROPELLED SPRAYER

IMPERADOR 3100

CUSTOMER AND IMPLEMENT INFORMATION REGISTRATION

IMPLEMENT:	
MODEL:	
SERIAL NUMBER:	
INVOICE DATE:	
OWNER'S NAME:	
ADDRESS:	
CITY:	
STATE:	COUNTRY:

ACKNOWLEDGMENT RECEIPT OF WARRANTY CLAIMS TERMS

I do hereby declare through this witness, that I have received, read and I am aware of the terms and conditions contained in the warranty document, which was delivered by an authorized Stara representative.

OWNER'S SIGNATURE: _____

NAME OF THE AUTHORIZED STARA DEALERSHIP: _____

ADDRESS OF THE AUTHORIZED STARA DEALERSHIP: _____

STAMP OF THE AUTHORIZED STARA DEALERSHIP: _____

SIGNATURE OF THE AUTHORIZED STARA DEALERSHIP:_____

WARRANTY REGISTRATION
DEALERSHIP COPY

SELF-PROPELLED SPRAYER

IMPERADOR 3100

CUSTOMER AND IMPLEMENT INFORMATION REGISTRATION

IMPLEMENT:	
MODEL:	
SERIAL NUMBER:	
INVOICE DATE:	
OWNER'S NAME:	
ADDRESS:	
CITY:	
STATE:	COUNTRY:

ACKNOWLEDGMENT RECEIPT OF WARRANTY CLAIMS TERMS

I do hereby declare through this witness, that I have received, read and I am aware of the terms and conditions contained in the warranty document, which was delivered by an authorized Stara representative.

OWNER'S SIGNATURE: _____

NAME OF THE AUTHORIZED STARA DEALERSHIP: _____

ADDRESS OF THE AUTHORIZED STARA DEALERSHIP: _____

STAMP OF THE AUTHORIZED STARA DEALERSHIP: _____

SIGNATURE OF THE AUTHORIZED STARA DEALERSHIP:_____

Stara
Constant Evolution

TECHNICAL DELIVERY TERMS

SELF-PROPELLED SPRAYER

IMPERADOR 3100

(To be completed by the technician)

CLIENT COPY

DELIVERY DATE: _____/_____/_____
DEALERSHIP INVOICE: _____DATA: _____/_____/_____
MANUFACTURER INVOICE:_____DATE:_____/_____/_____

CLIENT INFORMATION

NAME:	CONTACT:
ADDRESS:	
CITY:	UF:

PRODUCT INFORMATION

MODEL:	
MANUFACTURED DATE:	SERIAL Nº:

TECHNICIAN RESPONSIBILITIES

( ) Check general conditions of the machine (defects, dents and others);

Notes:_____

( ) Check engine oil level before starting the machine;

( ) Check the hydraulic oil reservoir level;

( ) Check the radiator fluid level;

( ) Re-tighten wheel bolts to 450 N/m;

( ) Use maximum allowable tire pressure;

( ) Lubricate all indicated points on the machine;

( ) Check and instruct on wheel sensor calibration;

( ) Check and instruct on flowmeter calibration;

( ) Instruct regarding re-tightening clamps and couplings in case of leaks;

( ) Train and adjust the boom disarming spring tension;

( ) Train and adjust the boom braking system cylinders;

( ) Apply two solution tanks and check its drainage;

( ) Train and check the general operation of the spraying system, from the tank to the spray nozzles;

( ) Train and check that the screws and belts are tight, and lubricate periodically;

( ) Instruct that all screws should be re-tightened after the first 10 working hours of operation;

( ) Instruct on opening, closing, braking and boom adjustments;

( ) Instruct on the leveling of the booms with relationship to the terrain;

( ) Instruct on the triple washing of the product mixer and containers;

( ) Remove the booms safety lockouts before unfolding them;

( ) Instruct on flowmeter maintenance and cleaning;

( ) Instruct on the spraying system maintenance;

( ) Instruct on product fill-up;

( ) Instruct on working with the GPS, Auto-Pilot and the Topper spray controller;

( ) Instruct on the control panel operations;

( ) Emphasize the importance of not mixing different oil brands, and to only use the hydraulic oil specified in this manual;

( ) Show the spraying system operation (valves, flow-rate adjustments, clean water tank);

( ) Instruct on main filter and line filter cleaning;

( ) Instruct on the manual adjustment (manual mode) of the flow-rate (pressure) at the electric flow-rate valve;

( ) Instruct on solution tank and spraying system cleaning, using clean water;

( ) Instruct on the hydro system cleaning process;

( ) Instruct on the use of roadway signaling equipment (turn-signals and the safety rotary beacon);

( ) Instruct on emergency braking (hand-brake);

( ) Fill-out the warranty certificate, the technical delivery terms and, issue the instruction manual;

( ) Safety procedures contained in this manual.

TOPPER DRIVER 2 WAS AUTO-PILOT

( ) Verify wheel angle sensor tightness;

( ) Verify POD positioning;

( ) AGage the pilot's job route as used by customer;

( ) Verify hydraulic operation;

( ) Verify right and left valve operations.

TOPPER CONTROLLER

( ) Show how to track the spray PODs.

( ) Show the calibration procedure and calibrate: flow-meter (product), tank levels, calibrated return;

( ) Calibrate speed sensor(self-propelled wheel sensor), show the proper calibration process;

( ) Show over-lapping procedure and screen painting;

( ) Show how to configure the alarms according to the customer's needs;

( ) Show how to import/export maps using the Topper's USB connection, Job and Field Plots;

MACHINE ITEMS WHICH INFLUENCE THE PROPER OPERATION OF THE TOPPER

( ) Show the cleaning process of the sprayer line filters and nozzles;

( ) Show the Sprayer main filter clean-up process, which is located before the centrifugal pump;

( ) Explain the Spraying system operation, the filling process, and the product mixer using the flask-washer.

( ) Reinforce the importance of maintaining good flow-meter maintenance practices and cleaning.

SENSOR ON-BOARD COMPUTER

( ) Show all steering column functions, blinkers, hazard lights, headlights, floodlights, windshield washer, windshield wipers, radio and safety rotary beacon.

( ) Turn-on the machine and show all operations of the on-board computer like the sensors, the hand-brake to ladder unfolding correlation, the start-up switch to the distribution discs and their on-screen/rear operation verification, the auto-pilot kill switch and the joystick functions like: application, Auto-Pilot and gear changing.

( ) Scroll through the Sensor panel, explain its adjustment functions and the machine diagnostics displays like, the water temperature, oil,transmission; verify that the Joystick and Console control functions are communicating with the screen.

( ) Verify that the nuts are tight on the sensors the with orange connectors, since it is responsible for sealing the sensors, to tighten you will hear 3 snaps when tight, no tools are needed.

( ) Inform the client and the operator that there should no changes made to the relay panel, unless authorized by Stara, since any modifications can damage the machine, it was designed specifically and solely for the safe operation of the machine.

( ) Inspect the chassis grounding points of the machine, verify that all points are secure and that there is no paint on the welded grounding bolts, making sure that they have been sanded.

( ) Show the steps to access the saved events, along with client and operator information, explaining that all processed commands on the Sensor On-Board Computer remain saved in events on the *information* item, where the latest machine version is shown, should the need arise for such information.

ADDITIONAL INFORMATION

_____
_____
_____
_____

We declare that the machine referenced in this document, is being delivered under normal working conditions of use, as described and, with the various adjustments and instructions.

_____, _____ / _____ / _____

Location Date

_____

CLIENT SIGNATURE

_____

TECHNICAL REPRESENTATIVE'S SIGNATURE

Stara
Constant Evolution

TECHNICAL DELIVERY TERMS

SELF-PROPELLED SPRAYER

IMPERADOR 3100

(To be completed by the technician)

CLIENT COPY

DELIVERY DATE: _____/_____/_____
DEALERSHIP INVOICE: _____DATA: _____/_____/_____
MANUFACTURER INVOICE:_____DATE:_____/_____/_____

CLIENT INFORMATION

NAME:	CONTACT:
ADDRESS:	
CITY:	UF:

PRODUCT INFORMATION

MODEL:	
MANUFACTURED DATE:	SERIAL Nº:

TECHNICIAN RESPONSIBILITIES

( ) Check general conditions of the machine (defects, dents and others);

Notes:_____

( ) Check engine oil level before starting the machine;

( ) Check the hydraulic oil reservoir level;

( ) Check the radiator fluid level;

( ) Re-tighten wheel bolts to 450 N/m;

( ) Use maximum allowable tire pressure;

( ) Lubricate all indicated points on the machine;

( ) Check and instruct on wheel sensor calibration;

( ) Check and instruct on flowmeter calibration;

( ) Instruct regarding re-tightening clamps and couplings in case of leaks;

( ) Train and adjust the boom disarming spring tension;

( ) Train and adjust the boom braking system cylinders;

( ) Apply two solution tanks and check its drainage;

( ) Train and check the general operation of the spraying system, from the tank to the spray nozzles;

( ) Train and check that the screws and belts are tight, and lubricate periodically;

( ) Instruct that all screws should be re-tightened after the first 10 working hours of operation;

( ) Instruct on opening, closing, braking and boom adjustments;

( ) Instruct on the leveling of the booms with relationship to the terrain;

( ) Instruct on the triple washing of the product mixer and containers;

( ) Remove the booms safety lockouts before unfolding them;

( ) Instruct on flowmeter maintenance and cleaning;

( ) Instruct on the spraying system maintenance;

( ) Instruct on product fill-up;

( ) Instruct on working with the GPS, Auto-Pilot and the Topper spray controller;

( ) Instruct on the control panel operations;

( ) Emphasize the importance of not mixing different oil brands, and to only use the hydraulic oil specified in this manual;

( ) Show the spraying system operation (valves, flow-rate adjustments, clean water tank);

( ) Instruct on main filter and line filter cleaning;

( ) Instruct on the manual adjustment (manual mode) of the flow-rate (pressure) at the electric flow-rate valve;

( ) Instruct on solution tank and spraying system cleaning, using clean water;

( ) Instruct on the hydro system cleaning process;

( ) Instruct on the use of roadway signaling equipment (turn-signals and the safety rotary beacon);

( ) Instruct on emergency braking (hand-brake);

( ) Fill-out the warranty certificate, the technical delivery terms and, issue the instruction manual;

( ) Safety procedures contained in this manual.

TOPPER DRIVER 2 WAS AUTO-PILOT

( ) Verify wheel angle sensor tightness;

( ) Verify POD positioning;

( ) AGage the pilot's job route as used by customer;

( ) Verify hydraulic operation;

( ) Verify right and left valve operations.

TOPPER CONTROLLER

( ) Show how to track the spray PODs.

( ) Show the calibration procedure and calibrate: flow-meter (product), tank levels, calibrated return;

( ) Calibrate speed sensor(self-propelled wheel sensor), show the proper calibration process;

( ) Show over-lapping procedure and screen painting;

( ) Show how to configure the alarms according to the customer's needs;

( ) Show how to import/export maps using the Topper's USB connection, Job and Field Plots;

MACHINE ITEMS WHICH INFLUENCE THE PROPER OPERATION OF THE TOPPER

( ) Show the cleaning process of the sprayer line filters and nozzles;

( ) Show the Sprayer main filter clean-up process, which is located before the centrifugal pump;

( ) Explain the Spraying system operation, the filling process, and the product mixer using the flask-washer.

( ) Reinforce the importance of maintaining good flow-meter maintenance practices and cleaning.

SENSOR ON-BOARD COMPUTER

( ) Show all steering column functions, blinkers, hazard lights, headlights, floodlights, windshield washer, windshield wipers, radio and safety rotary beacon.

( ) Turn-on the machine and show all operations of the on-board computer like the sensors, the hand-brake to ladder unfolding correlation, the start-up switch to the distribution discs and their on-screen/rear operation verification, the auto-pilot kill switch and the joystick functions like: application, Auto-Pilot and gear changing.

( ) Scroll through the Sensor panel, explain its adjustment functions and the machine diagnostics displays like, the water temperature, oil,transmission; verify that the Joystick and Console control functions are communicating with the screen.

( ) Verify that the nuts are tight on the sensors the with orange connectors, since it is responsible for sealing the sensors, to tighten you will hear 3 snaps when tight, no tools are needed.

( ) Inform the client and the operator that there should no changes made to the relay panel, unless authorized by Stara, since any modifications can damage the machine, it was designed specifically and solely for the safe operation of the machine.

( ) Inspect the chassis grounding points of the machine, verify that all points are secure and that there is no paint on the welded grounding bolts, making sure that they have been sanded.

( ) Show the steps to access the saved events, along with client and operator information, explaining that all processed commands on the Sensor On-Board Computer remain saved in events on the *information* item, where the latest machine version is shown, should the need arise for such information.

ADDITIONAL INFORMATION

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We declare that the machine referenced in this document, is being delivered under normal working conditions of use, as described and, with the various adjustments and instructions.

_____, _____ / _____ / _____

Location Date

_____

CLIENT SIGNATURE

_____

TECHNICAL REPRESENTATIVE'S SIGNATURE

Stara
Constant Evolution

1st. TECHNICAL CHECK-UP

IMPERADOR 3100

SELF-PROPELLED SPRAYER

Periodic inspection - 250 hours

DOCUMENT - CLIENT COPY

CHECK-UP DATE:
Nº OF HECTARES:

SERIAL Nº:	Nº OF HOURS:
OWNER:	DATE:
CITY:	UF:
DEALERSHIP:	
TECHNICIAN:	

ITEMS TO BE REPLACED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the conditions of the hoses.

( ) Check Topper's calibration.

( ) Check the flowmeter rates.

( ) Verify boom length on Topper's calibration entry.

( ) Verify the number of sections.

( ) Check the number of nozzles per section.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

Stara
Constant Evolution

1st. TECHNICAL CHECK-UP

IMPERADOR 3100

SELF-PROPELLED SPRAYER

Periodic inspection - 250 hours

DOCUMENT - CLIENT COPY

CHECK-UP DATE:
Nº OF HECTARES:

SERIAL Nº:	Nº OF HOURS:
OWNER:	DATE:
CITY:	UF:
DEALERSHIP:	
TECHNICIAN:	

ITEMS TO BE REPLACED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the conditions of the hoses.

( ) Check Topper's calibration.

( ) Check the flowmeter rates.

( ) Verify boom length on Topper's calibration entry.

( ) Verify the number of sections.

( ) Check the number of nozzles per section.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

Stara
Constant Evolution

2nd. TECHNICAL CHECK-UP

SELF-PROPELLED SPRAYER

IMPERADOR 3100

Periodic inspection - 500 hours

DOCUMENT - CUSTOMER COPY

DATA VISTORIA:
Nº DE HECTARES:

Nº DE SÉRIE:	Nº DE HORAS:
PROPRIETÁRIO:	DATA:
CIDADE:	UF:
REVENDEDOR:	
TÉCNICO:	

ITEMS TO BE CHANGED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

( ) Radiator fluids.

HYDRAULIC SYSTEM

( ) Suction filter.

COMPONENTS

( ) Flowmeter.

( ) Charcoal activated filter.

( ) Tie-rod bushings.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the condition of the hoses.

( ) Verify the Topper's calibration.

( ) Verify flowmeter rates.

( ) Verify boom length on Topper's calibration entry.

( ) Verify the number of sections.

( ) Check the number of nozzles per section.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

Stara
Constant Evolution

2nd. TECHNICAL CHECK-UP

SELF-PROPELLED SPRAYER

IMPERADOR 3100

Periodic inspection - 500 hours

DOCUMENT - CUSTOMER COPY

DATA VISTORIA:
Nº DE HECTARES:

Nº DE SÉRIE:	Nº DE HORAS:
PROPRIETÁRIO:	DATA:
CIDADE:	UF:
REVENDEDOR:	
TÉCNICO:	

ITEMS TO BE CHANGED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

( ) Radiator fluids.

HYDRAULIC SYSTEM

( ) Suction filter.

COMPONENTS

( ) Flowmeter.

( ) Charcoal activated filter.

( ) Tie-rod bushings.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the condition of the hoses.

( ) Verify the Topper's calibration.

( ) Verify flowmeter rates.

( ) Verify boom length on Topper's calibration entry.

( ) Verify the number of sections.

( ) Check the number of nozzles per section.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

Stara
Constant Evolution

3rd TECHNICAL CHECK-UP

IMPERADOR 3100

SELF-PROPELLED SPRAYER

Periodic inspection - 1000 hours

DOCUMENT - DEALERSHIP COPY

DATA VISTORIA:
Nº DE HECTARES:

Nº DE SÉRIE:	Nº DE HORAS:
PROPRIETÁRIO:	DATA:
CIDADE:	UF:
REVENDEDOR:	
TÉCNICO:	

ITEMS TO BE CHANGED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

( ) Radiator fluids.

( ) Replace belts.

( ) Adjust valves.

( ) Clean injector nozzles.

( ) Inspect motor mounts and dampeners.

( ) Drain and clean-out fuel tank.

HYDRAULIC SYSTEM

( ) Suction filter.

( ) Change transmission oil - rear tank.

( ) Change self-cleaning filter element.

COMPONENTS

( ) Flowmeter.

( ) Change filter and clean-out A/C unit.

( ) Charcoal activated filter.

( ) Tie-rod bushings.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the condition of the hoses.

( ) Check Topper's calibration.

( ) Check flowmeter rates.

( ) Verify the boom lengths.

( ) Verify the number of sections.

( ) Check on the number of nozzles per sections.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

Stara
Constant Evolution

3rd TECHNICAL CHECK-UP

IMPERADOR 3100

SELF-PROPELLED SPRAYER

Periodic inspection - 1000 hours

DOCUMENT - DEALERSHIP COPY

DATA VISTORIA:	
Nº DE HECTARES:	

Nº DE SÉRIE:	Nº DE HORAS:
PROPRIETÁRIO:	DATA:
CIDADE:	UF:
REVENDEDOR:	
TÉCNICO:	

ITEMS TO BE CHANGED

ENGINE - DIESEL MWM

( ) Change oil filter.

( ) Change air filter.

( ) Change fuel filter.

( ) Change reduction gear oil.

( ) Radiator fluids.

( ) Replace belts.

( ) Adjust valves.

( ) Clean injector nozzles.

( ) Inspect motor mounts and dampeners.

( ) Drain and clean-out fuel tank.

HYDRAULIC SYSTEM

( ) Suction filter.

( ) Change transmission oil - rear tank.

( ) Change self-cleaning filter element.

COMPONENTS

( ) Flowmeter.

( ) Change filter and clean-out A/C unit.

( ) Charcoal activated filter.

( ) Tie-rod bushings.

ITEMS TO BE INSPECTED

( ) Check for leaks.

( ) Check the condition of the hoses.

( ) Check Topper's calibration.

( ) Check flowmeter rates.

( ) Verify the boom lengths.

( ) Verify the number of sections.

( ) Check on the number of nozzles per sections.

We hereby declare that the referenced machine of this form has gone through a check-up and orientation procedure, according to the instructions contained in the technical delivery terms.

DEALER'S STAMP AND SIGNATURE:_____

CLIENT'S SIGNATURE:_____

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